The Mining Journal

Established 1835 — Railway & Commercial Gazette

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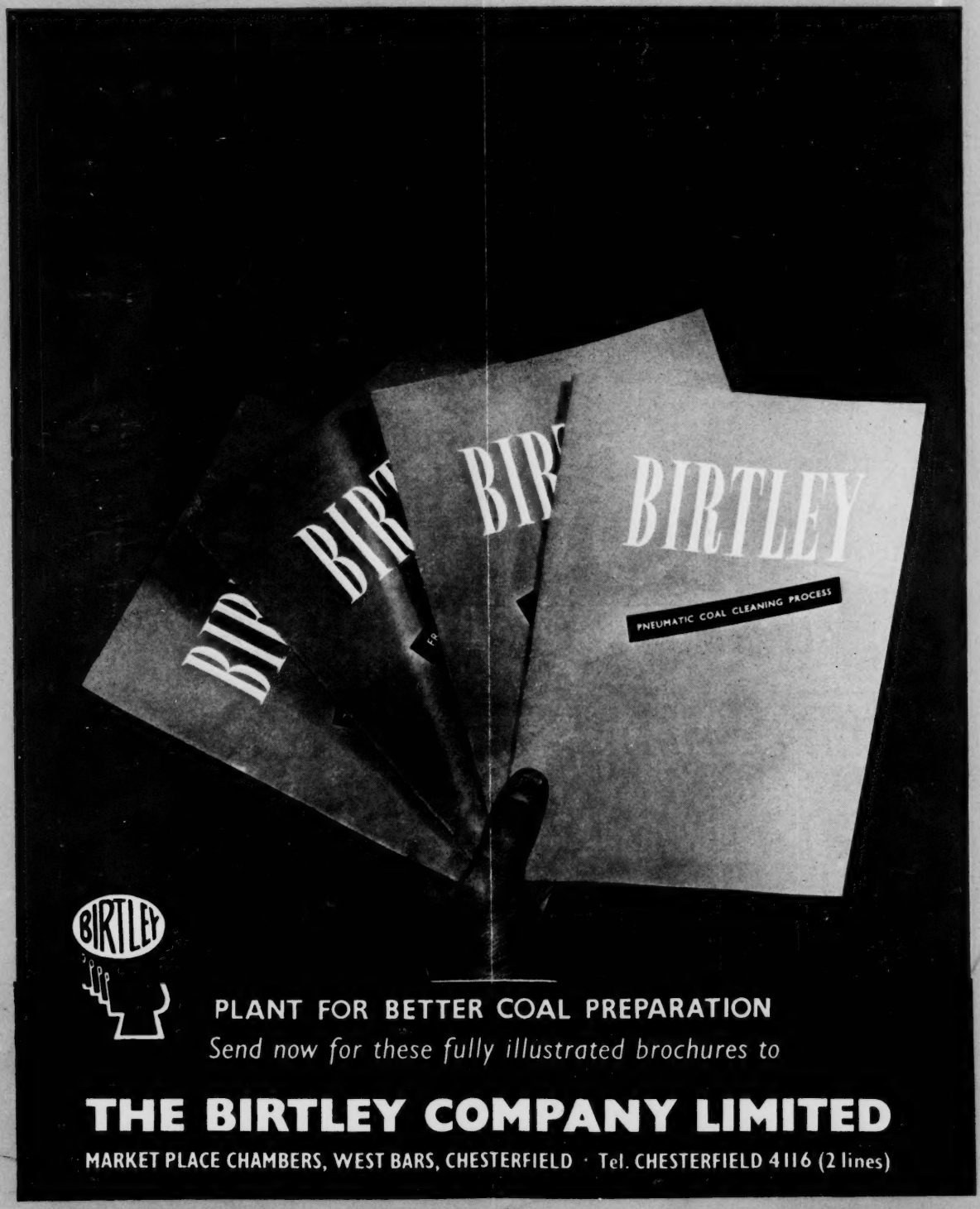

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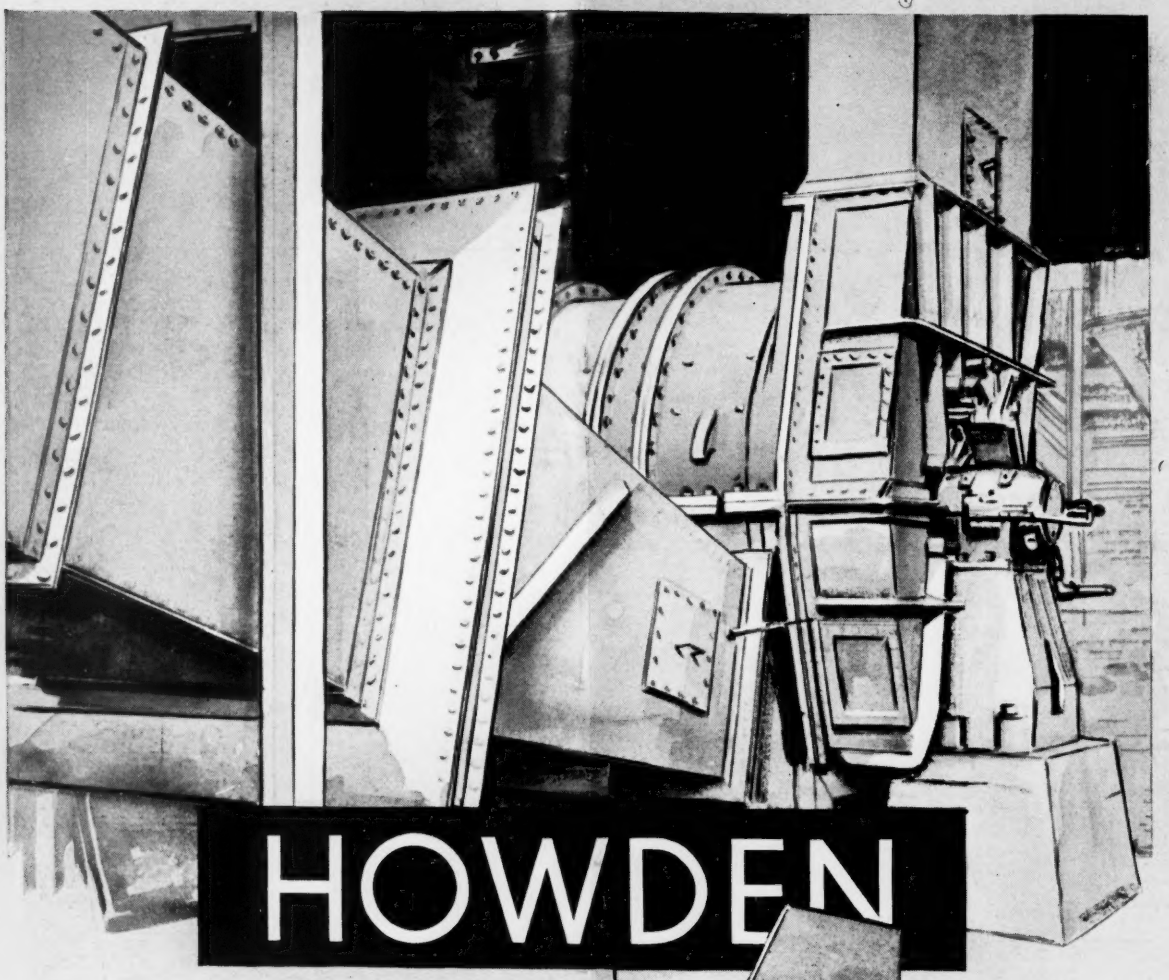

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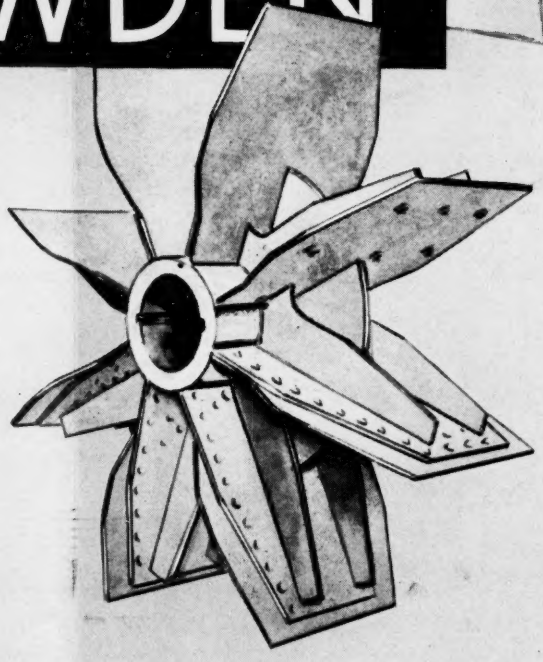

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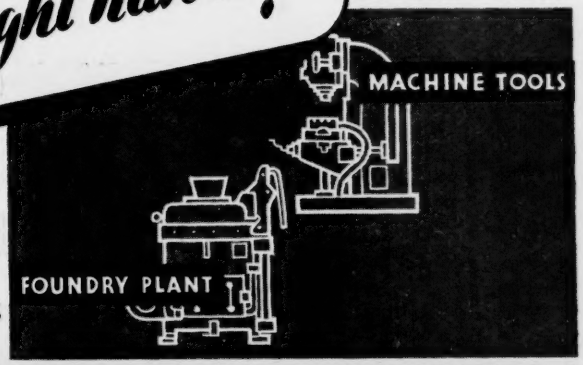

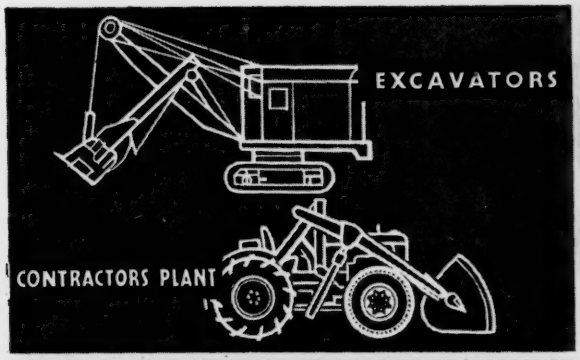

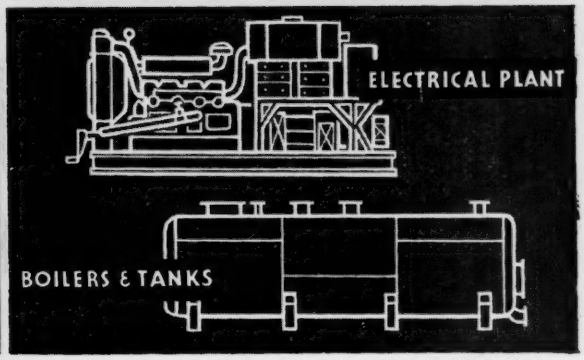

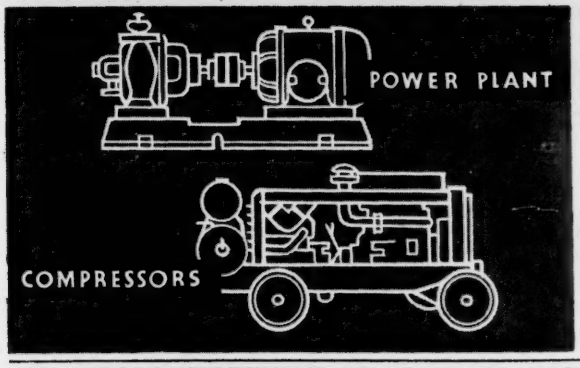

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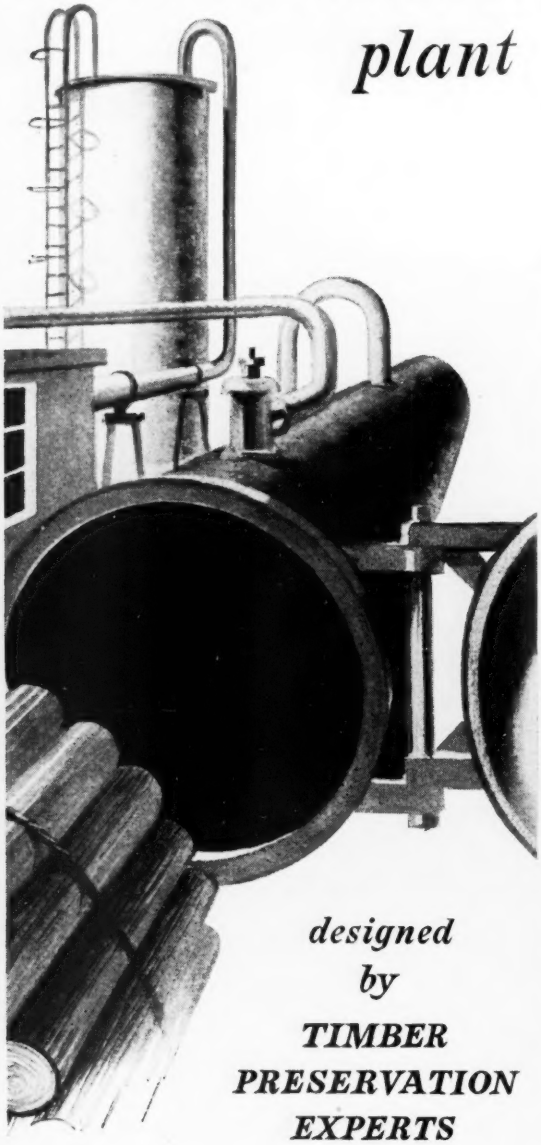

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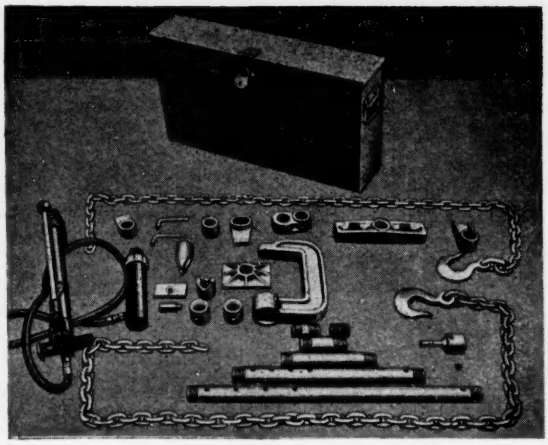

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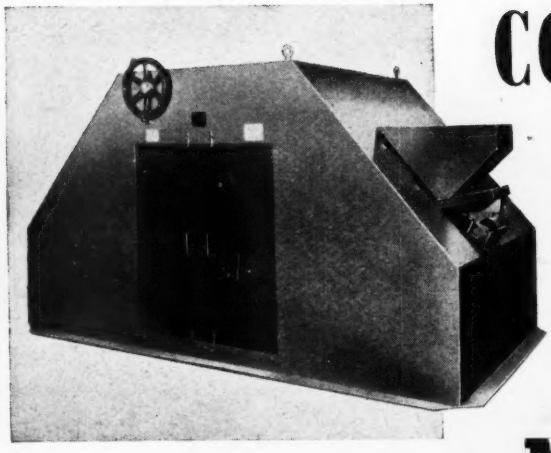

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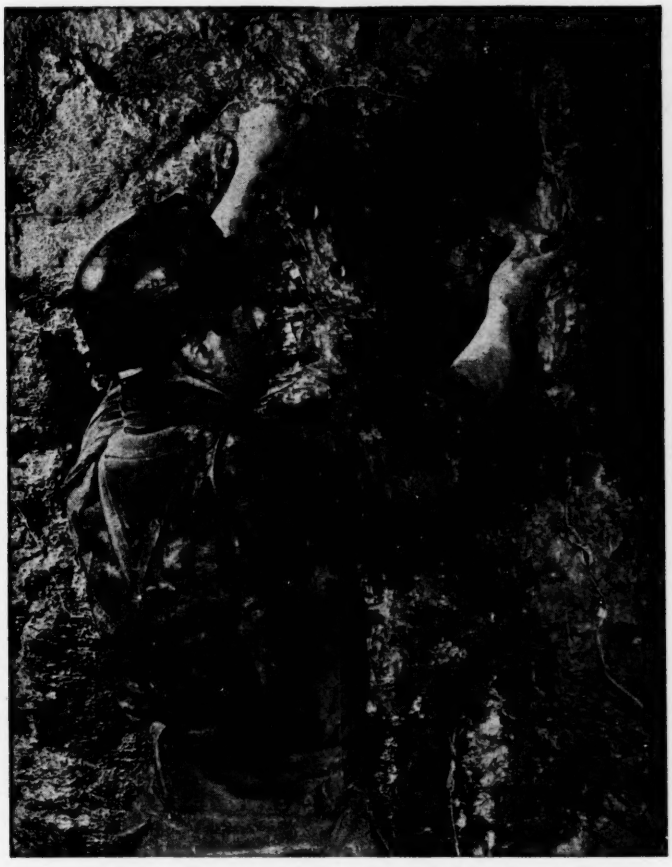

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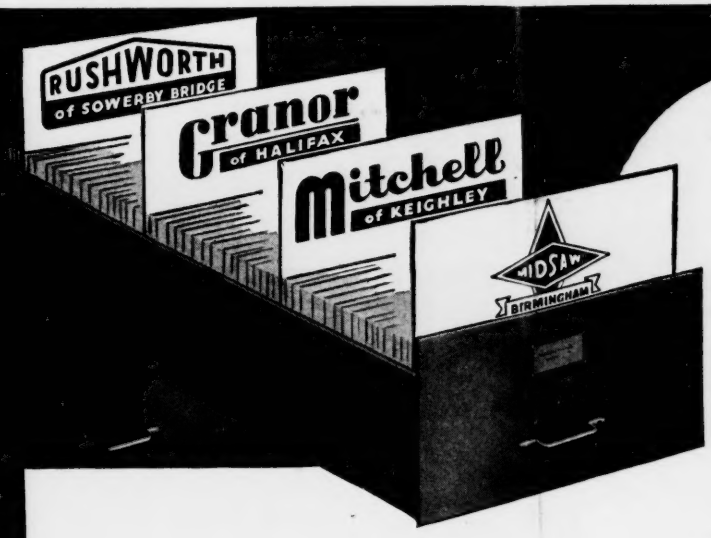

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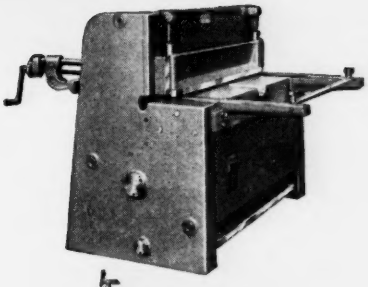

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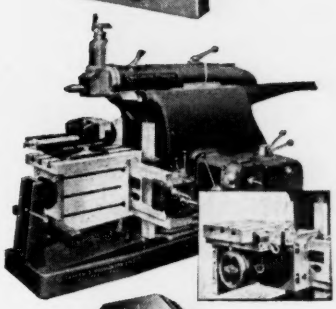

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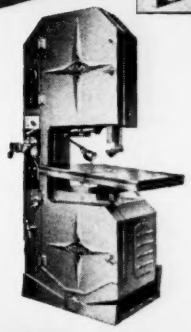

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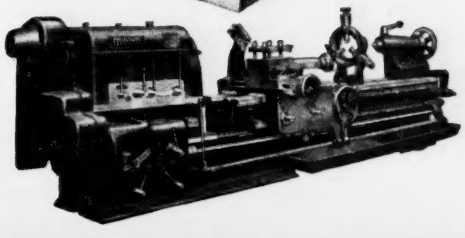

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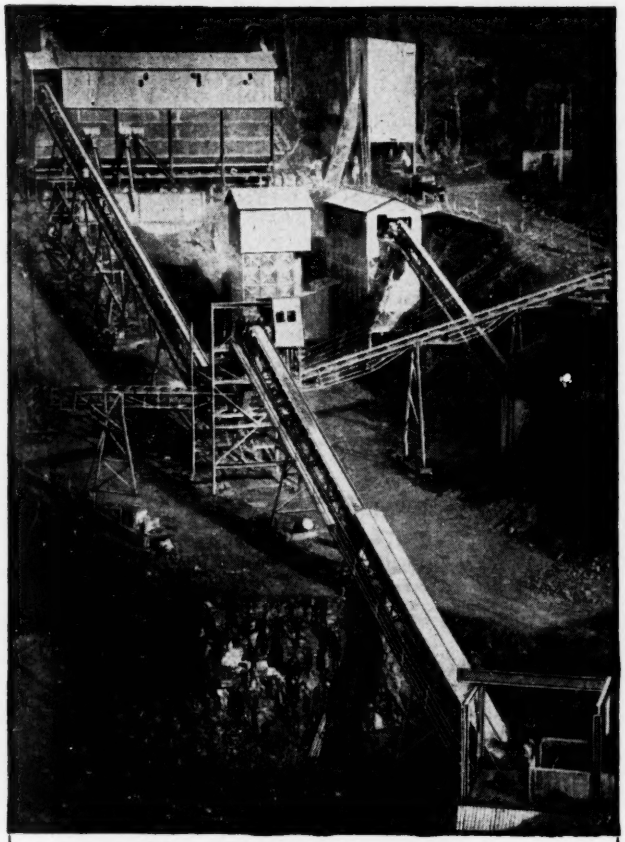

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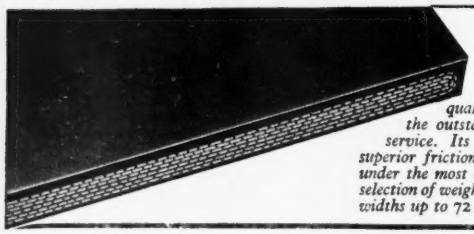

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The Mining Journal

Established 1835

Vol. CCXLI No. 6162 **LONDON, SEPTEMBER 25, 1953** **PRICE 8d**

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NOTES AND COMMENTS

U.S. Stockpiling Programme Revision

The policy of the United States Administration in regard to stockpiling is an issue of high importance in relation to the supply and prices of metals and minerals.

We noticed in our issue of September 11 a statement by the Office of Defense Mobilization which certainly seemed to indicate, if somewhat cautiously, a slowing down of this operation. Six alloying materials, according to this statement, were to be given high priority, together with a prolongation of delivery dates generally in other cases, with a limitation of future contracts to a period of 12 months. At the Seattle meeting this week of the American Mining Congress, however, the director of O.D.M., Mr. Flemming, appears, according to the brief cable report we have received, to have struck a somewhat different note. "We are," he is reported as saying, "reviewing the basic assumptions underlying our stockpile objectives, and in the light of our conclusions a careful reappraisal will be made of the objective for each material. If there is a reasonable doubt as to whether a stockpile objective should be set at a higher figure or a lower figure the doubt should always be resolved in favour of the higher figure. This Administration will pursue such a policy. Also stockpile purchase programmes will be carried out, even though it may be necessary for the civilian economy to tighten its belt during a given period of time, but where the evidence is conclusive that a stockpile objective is adequate, and where we have purchased all that is called for by that objective, then the Government will no longer have any justification for using stockpile funds for additional purchases."

This statement may perhaps help to explain the apparent contradiction of relaxing stockpiling while negotiating large acquisitions of copper and tin which have been under discussion for some little time. Of course, the circumstances under which Mr. Flemming spoke must be remembered. The American Mining Congress has exhibited on various occasions strong opposition to the Administration's policy of stimulating the import of mineral products from abroad and resisting, or at least deferring, the imposition of higher import duties, and it may be that the Administration feels at the present time that the rising resentment in Western mining circles against the effects of liberalizing United States trade must be appeased. Quite apart from this, they may feel that recent manifestations of Soviet intransigence in the United Nations discussions, and the increasing difficulties arising over Korea, convey a warning not to be disregarded. We shall, no doubt, in due course get full reports of all Mr. Flemming said, and of any comments which his statement may have elicited. For the moment, however, the impression conveyed is that the tone of the earlier communiqué by the O.D.M. is not altogether in accord with the Administration's present mood.

Bank Rate Reduced to 3½ Per Cent

The announcement from the Bank of England on Thursday of last week of a reduction in the Bank Rate from 4 to 3½ per cent came as an unexpected but welcome surprise.

Unexpected because a reduction in the Bank Rate is traditionally considered as an expression of the Government's confidence to deal with the existing economic climate and any disruptive development likely to occur in the immediate future. At the time of the announcement Wall Street was displaying unusual weakness which might well have been indicative of an impending recession. Coupled with these fears was the easier tendency of the £ in relation with other currencies only partly allayed by assurances that its softening was seasonal and not to be considered as foreshadowing future trends. Moreover, pressure had been, and still is for that matter, building up on the labour front in the United Kingdom for further upward adjustments in wages which, it is believed, would place this country's exports in a less competitive position if they were granted.

Seen against this background the decision to lower the Bank Rate is indeed an expression of confidence, albeit of necessity based on the calculated risk that a recession of any size would not eventuate in the United States. For even with our better balance of payment position and increased holdings of gold and dollars, the chances of our weathering the effects of anything more than a mild recession in the United States would rest as much on faith and hope as on our continued ability in these circumstances to pay our way.

The announcement was welcome because it brings further freedom and flexibility in interest rates which can therefore be more easily modified to fit in with major policy directives outlined in future by the Chancellor. Its immediate benefit will be to give the Chancellor some relief on the Debt charge before next April thereby increasing

much needed tax remissions. In the longer run, it is hoped that the Bank Rate reduction will reverse the current trend and stimulate industrialists to invest in new production.

Mr. Prain on Copper

Mr. R. L. Prain, chairman of the Rhodesia Selection Trust, interviewed by a correspondent of the *Financial Times* in Ndola this week, said he considered the present price of copper satisfactory, which from a producer's point of view could hardly be otherwise. Whether the consumers are equally satisfied is another matter, especially when we consider that the United States price was 24½ c. per lb. until the Chileans refused to sell under 35½ c. This circumstance no doubt accounts for what he considers the anomaly of forward metal being at a discount. Incidentally, the same price relationship exists in the other base metals, lead, tin and zinc, and quotations on the New York Commodity Exchange have long indicated a general belief in America that the prices for all four were due to decline considerably in the future. Mr. Prain expressed the view that more copper was now being produced in America below Rhodesian costs than above; the day is long past when Northern Rhodesian copper could be profitably marketed at £40 a ton.

Much depends, of course, on how he was estimating the cost. From the point of view of the company's profits, account must be taken of all expenses incurred before the metal is sold, and in the case of Northern Rhodesian production this would involve very large expenditures on exploration and development, both of which are, so far as his group at any rate is concerned, at a maximum level. Whereas much of the American production is from a few great properties with enormous tonnages of ore already developed, it is the marginal mines, numerically the largest group, which would feel the pinch of a substantial fall in copper prices and are most vocal in demanding subsidy or protection.

Oil From Coal in South Africa

New developments are now taking place which may have a considerable effect on the future of the coal industry in the Union of South Africa and in Southern Rhodesia, writes our coal correspondent. A plant for the production of 200,000 tons per annum of petrol, fuel oil and wax from coal by the Fischer-Tropsch process is being constructed at Coalbrook in the Orange Free State and consideration is being given to the installation of a similar plant in Southern Rhodesia

The conditions for successful developments along these lines are far more favourable in South Africa than in Western Europe and the U.S.A. because the conversion of coal into oil by this process is economically justified only when coal is cheap compared with oil. The reaction between hydrogen and carbon-monoxide in this process is strongly escothermic and the heat liberated during the formation of 1 lb. of hydrocarbons from these gases amounts to 7,000 B.Th.U. and the nature of the end products depends largely on the extent to which the temperature of the catalyst can be kept under control.

The economic importance of the process in South Africa may be considerably enhanced if the method can be combined with the generation of power and the manufacture of other commodities such as calcium carbide and pig-iron.

Outlook for the U.K. Iron and Steel Industry

There are a few cross currents in the iron and steel industry which tend to obscure the outlook. The U.S. defence expenditure is gradually moving to lower levels. Steel production both in the U.S. and in Germany is also declining and it is arguable that the British branch of the industry is exposed to the same restrictive influences. But the fact is that since the beginning of September a new steel plant with an annual capacity of 500,000 tons has come into production and the Steel Company of Wales has announced the forthcoming resumption of some of the old hand mills in South Wales which have been idle since April last.

The further announcement of the placing of an order for rolling equipment to the value of £4,000,000 for South Wales is a timely reminder of another important factor which must be taken into account in any attempted assessment of the industrial outlook. Spread over the next five years the British steel industry's second development plan will involve an average expenditure of over £1,000,000 a week. As this work steadily progresses it promises all the attendant advantages of improved techniques and reduced costs.

As an indication of the keener competitive conditions which are now developing it may be mentioned that the European Steel Pool recently adopted a price convention which reduced export prices in many instances to a lower level that world prices. Continental consumers are already protesting against this differentiation, which has also adversely affected the overseas trade in British re-rolled products. But with this exception the U.K. steel industry is still busily engaged, and it is no disadvantage that arrears of delivery have been largely overtaken, thereby enabling producers to indicate earlier dates for the execution of new specifications.

N.C.B. Makes Small Profit in June Quarter

For the second quarter in succession the National Coal Board has announced a profit, albeit a small one. Profits in the June quarter before interest payments, but after providing £2,000,000 for taxation, were £4,858,187. Yet after meeting interest charges of £4,050,000 the net surplus was reduced to £80,817.

The latest profit figure, though small, takes on a more substantial appearance compared with the corresponding quarter in 1952—when a deficit of £728,000 was reported after tax charges of only £795,000 and interest payments of £3,900,000. Moreover, it was made during the period covering Easter, Whitsuntide and Coronation holidays as well as part of the second week's paid holiday granted this year to coal miners.

Despite the improvement shown, the Board's outlook cannot be viewed as bright. The full impact of the miners' second week's paid holiday has yet to be taken into account; there is another claim for higher wages pending; while if we turn to the production results it will be noted that the present position shows a total output figure 2,500,000 tons down from the 158,500,000 tons produced in the corresponding period in 1952. Quite apart from the possibility that this short-fall in production may mean less than the desired stock target, additions to which have not been helped by the increased consumption, it means that the chances of this country being able to increase substantially its exports of coal are very slim indeed.

In previous years the coal miners have responded well in the closing months of the year, to raise production and it may be that their efforts during the remaining weeks of the year will bring about a welcome change in the present position. Be that as it may, and although no effort is being spared to ensure that the mines are supplied with the latest types of machinery and equipment, and that the miners themselves are treated with every consideration, this country finds itself once more faced with the problem of having to rely on an unusually good spell of weather to balance supply and demand.

Australia

(From Our Own Correspondent)

Melbourne, August 31.

There is definite improvement in the gold mining industry in Western Australia and the general attitude of the public toward it. Production to the end of July has been 477,455 f.oz. compared with 412,306 f.oz. for the same period of 1952. Investors are turning attention to gold and already several gold mining flotations are making progress. The centre of attraction is the Mount Magnet field to which attention has been attracted by the outstanding success of the Hill 50 mine. The ore occurrence which is producing sensational results is a large drag fold on the leg of a syncline, the orebody being 70 ft. average width, about 500 ft. long, and with vertical persistence so far indicated to the 1,200 ft. horizon. The principal feature in the structure of the field is the pronounced anticlinal and synclinal folding, and reports on abandoned mines show that the orebodies worked were intimately connected with drag folding. Immediate work to be undertaken by newly formed companies will be geological surveys, followed by diamond drilling to locate repetitions of the upper drag folds.

THE KALGOORLIE GOLDFIELD

On the Kalgoorlie goldfield the general position has improved greatly in the past two years, and further improvement is to be expected. Developments on Lake View and Star continue to be satisfactory, and new lodes are being located in the mine of Great Boulder Pty. Gold Mines. Both these mines have made substantial cost reductions, and with the completion of the new power plant on the Great Boulder mine a reduction in costs of some £A60,000 per year is anticipated. Improved practice in mining and milling is effecting reductions in costs in these operations, and this mine is in a very satisfactory economic position. The same can be said of Lake View and Star, where output has been increased and ore reserves have been advanced concurrently, factors which are very encouraging pointers to the future of the mines and of the field. North Kalgurli (1912) Ltd., with the new main shaft in operation, is in a position to handle its output more economically, and can be classed as one of the big three of the field. Diamond drilling has disclosed high grade ore on the No. 6 level of the North Kalgurli section, with values of 347 dwt. per ton over 18 in., while in the same section a borehole has shown 160 dwt. per ton over 24 in. In the Kalgurli section at No. 8 level a drill core has shown 44 dwt. over 60 in., 4 dwt. over 42 in., 10 dwt. over 36 in., and 6.4 dwt. over 336 in. The steam winder on the Kalgurli shaft is being replaced by an electric winder.

Gold Mines of Kalgoorlie continues to open up well, particularly in the property recently bought from Paringa Mining and Exploration Co., where driving is in high grade ore. The purchase of the Paringa mine is generally regarded as highly satisfactory to the Gold Mines of Kalgoorlie company. There is satisfaction in results obtained in diamond drilling by Kalgoorlie Southern Gold Mines to prospect for repetition of the Kalgoorlie system of ore occurrences to the south of the Golden Mile, and the data so far obtained from the four holes drilled has confirmed the initial interpretation of the geology of the area. A new syncline has been located, and if this fold gains in strength it is considered that it could be the host of a major ore occurrence.

Great Western Consolidated has disappointed because of the low grade of the ore mined in the open cut; underground ore is maintaining the grade established in sampling and the long range view is that as the ratio of underground to open cut ore increases, the general position of the company will improve. Costs are working out according to estimates. It is the company's intention to develop the other mines in the group, in which the average grade of ore is higher than in the Copperhead mine, now being worked. Mine costs are: mining 18.99s., treatment 18.00s., and development redemption 1.94s., making a total of 38.93s. per ton.

W.M.C. AT COOLGARDIE

The Western Mining Corporation has purchased from the Western Australian Government the mine and plant of the Tindals mine at Coolgardie, for £A35,000. The previous owners were the Consolidated Gold Mines of Coolgardie and the Government foreclosed on the company's assets because of failure to meet the loan made early in the war years. Western Mining Corporation's subsidiary company, New Coolgardie Gold Mines, has been operating successfully the Surprise and Barbara mines to the south of Coolgardie and the Callion mine, some 60 miles to the north, ore being milled at a central plant. It is expected that the new purchase will be brought into production as a member of the group. Recent reports from the Barbara mine show good values; winzing from No. 3 level for a depth of 37 ft. has shown an average grade of 37.9 dwt. over 49 in. and winzing from the No. 5 level is disclosing values of 18 dwt. gold per ton. In the 1952-53 period the company treated 65,029 tons of ore for the recovery of 34,956 f.oz. of gold. The grade of ore milled rose from 9.88 dwt. to 10.75 dwt. Costs for the year were 131.83s. per ton and ore reserves are 117,800 tons, with an average grade of 12.3 dwt. On the financial side, the bank overdraft of £57,836 has been converted into a credit of £17,525, and the debt to Western Mining Corporation has been reduced from £A127,000 to £A67,000. Prospects of the company are satisfactory.

GOLD PROSPECTING IN VICTORIA

Gold Mines of Australia is the only organization carrying on prospecting in this State. A number of years ago, diamond drilling was commenced, and discontinued, in the Stawell district. The company has renewed attention to its leases and has completed a preliminary geological and geophysical survey; a drilling programme has been planned to test favourable locations. The Stawell leases appear important.

The Central Victoria Dredging Company has reported a lower profit for the year just ended, the sum being £A43,719 compared with £A48,026 in the previous year. Two dredges are being worked; the Jim Crow dredge's yardage of 1,417,053 cu. yd. was less than the previous total and gold won was 7,167 f.oz. The Amphitheatre dredge's yardage was very low, though greater than in 1952, the figure being 865,467 cu. yd., but gold recovery increased substantially to 4,053 f.oz. When this dredge commenced work the nature of the ground made the clearing of the buckets very difficult, and dredge capacity was greatly reduced. Bucket cleaning apparatus has been installed and is reported to have proved satisfactory. The tightness of the ground, with reduced output, adversely affected costs but it is hoped that improvement will be made in the current year.

Wellington Alluvials is in an uncertain position between rising costs and the present price of gold. The company has decided to continue operations as long as possible and this decision has been followed by the entry of the dredge into better ground, and at a lower cost than had been anticipated. The grade improved to 2.2 gr. per cu. yd. and has since risen to 2.34 gr. per cu. yd. which closely approximates the boring results. The average value of the previous year's work was 1.53 gr. per cu. yd. Depending upon the price of gold and the cost of mining, the property is expected to have an economic life of 11 or 12 years.

Accessories in Nickel Converter Practice

By C. C. DOWNIE

In the following article, the author deals in turn with various accessories considered necessary to the refining of nickel matte in the converter. While some of these improvements are now established in practice, others require further research, and it is significant that the author's remarks are directed towards nickel only, as the improvements could be described as superfluous in the refining of copper matte to blister copper, or in the refining of cupro-nickel mattes.

In the refining of nickel matte in the converter, a number of accessories and improvements have been necessary, which could be described as superfluous in the refining of copper matte to blister copper, or in the refining of cupro-nickel mattes. These latter are dealt with in a more or less straightforward manner, as the process briefly relates more to one of directly oxidizing and removing the iron in the form of a silicate slag or " toppings."

Nickel matte, as obtained from the blast-smelting of garnierites, tends to contain a minute content of copper, which has to be drawn off in these latter skimmings, and necessitates the addition of salt-cake or other fluxes besides selected ganister, as has been described previously. This system was really the forerunner of what was later developed under the category of the " top-and-bottom " process, but which latter was implemented as a reverberatory system. Although the total tonnage of salt-cake consumed in the converter is small compared with that required in the top-and-bottom process, and even although this work has to be repeated at least once in the reverberatory furnace, it is large in proportion to the small amount of copper removed. In the converter process the salt-cake is charged directly, but in the reverberatory system it is first admixed with coal-slack. If the nickel blast matte contains from 0.1 to 0.2 per cent of copper, this only amounts to from 2 to 4½ lb. per ton, and which in the pure sulphide condition only contains some 20 per cent of sulphur, while even in crude condition, salt-cake rarely contains less than 20 per cent sulphur.

INTEREST IN PATENTED FLUXES

In practice, however, it is not possible to even expect anything near the molecular proportion of the sulphur content of the salt-cake to function in this manner, and as can be gathered, the addition of from 15 to 20 lb. of this flux each time it is required after removal of the toppings, is vastly more than what is necessary to form Cu_2S. The last fractions of copper are the more difficult to eliminate, but the additions of flux have to go on as before. It was this, amongst other features, which aroused interest in patented fluxes, which apart from removing copper more expeditiously, were claimed to be capable of easily handling much higher copper contents, and which hailed from experiences with the more complicated cobalt-bearing mattes.

Irrespective of their character, these fluxes had formerly been added to the converter by a long-handled shovel made for the purpose. One of the improved accessories suggested for this purpose was an arrangement for adding the exact proportion of flux automatically, but the extent to which it saw actual service is not known. This device comprised a weighing and measuring equipment connected to a hopper and lengthy chute operated by chains, and which was located above the converter, and to one side, i.e., out of the way of the blast. When the time came for making additions, the chains lowered the chute, and the exact amount was charged immediately. This not only made for greater accuracy and speedier working, but obviated the element of danger, which with molten nickel matte is a matter of no small importance.

Although wooden planking tends to burn, it was considered safer than iron, and appears to be still persevered with, while every effort is made to ensure that no water can enter the converter house, which in contact with molten matte can develop explosive violence, only surpassed by cobalt mattes, which scatter still more violently.

Another accessory still requiring further research is the sampling of the converter matte after removal of the toppings, which is done with iron spoons, and which tend to get nipped off at the shaft, and necessitate frequent replacement, while further, not giving a truly representative sample regarding iron contents of the matte.

HANDLING SLAGS AND TOPPINGS

For removal of collected converter slags or toppings, which are allowed to accumulate in separate heaps, a runway with travelling hoist traverses a maximum clear span of 37½ ft., for taking a load of 3 tons. This removes the material to the briquetting house, or depending on its copper content, for running through a 50 ton water-jacketed cupola. Unlike the direct transferance of blast slag to a water pit for graining, for utilizing in making tar macadam, etc., the converter slags cannot be safely dealt with in this way. They are simply drawn into slag bowls and allowed to cool off, and which originally ranged from 5 to 7 cu. ft. capacity because of their shallow disposition. It was later ascertained that they were not so tough and hard as was anticipated, and allowed a deeper design to be substituted which holds a maximum of 46 cwt. (Nickel blast slags with high magnesium contents are amongst the toughest materials known, and for many years were used for fortification purposes.) The practical feature here is that the converter slags may be readily broken up, by hammer, and as many as six different designs of slag bowls were tried out. The " silicate " slags are kept separate from the sulphide toppings as far as possible, although this does not always prevent some intermixing, and irrespective of this, there is always a certain modicum of copper in the silicate condition.

Toppings from the salt-cake reaction are relatively rich in copper, and some discrimination has to be made between them, as those at the start are much richer than the finally removed material, and it is but rarely that they are individually chemically analysed. (The terms slags, toppings and skimmerings, are somewhat loosely expressed in general metallurgical literature, but require to be more accurately defined where they are to be ultimately resmelted.) The initial toppings may contain anything up to four per cent or more of copper, whereas the final toppings, when the matte is almost copper-free, only contain one or two points per cent copper. One of the objects of installing the runway with travelling hoist, apart from economizing in labour, was to assist this discrimination, and forestall them being all slumped together, as had been done formerly.

The moulds for the converter matte are designed to form a type of ingot slightly larger at the top than the bottom, and tapered from one end to the other. Originally the length was 55 in. (top), 51 in. (bottom), tapering from 18 in. to 14 in. (width), and 4 in. deep, which when filled 3 in. deep with matte, amounted to 2.544 cu. in. capacity. Following the installation of larger converters, correspondingly larger moulds were substituted of 59 in. in length (top), 53 in. (bottom) with the width tapering from 20 to 14 in., and 6 in. deep, which when filled 5 in. deep gave a content of

4.760 cu. ft., i.e., an increase of 87½ per cent on former capacity. Despite these provisions to facilitate easy tapping into the moulds, and forestall spillages, other improved accessories have been specially constructed to obviate accidents.

SAFETY ARRANGEMENTS AND HEATING DEVICES

To maintain the converter perpetually in a state of stable equilibrium, numerous efforts have been made with larger designs such as the Pilz safety device, using a cam sheave and counterweight, etc., to maintain the hydraulic distribution gear under the closest control. With the smaller 3 ton capacity converters, all tilting was done manually by handwheel over spur and bevel gears, and being mounted on wheels, they could be readily run from the blast furnace spout to connect with the blower, and be turned around and tilted as required, and after the "blow," be run to another part of the track for fettling and repair. Where the danger arose was that in tapping the matte into the moulds, no compensation was possible for any over-tilting and subsequent spillage, as the same carefully designed gears afforded no provision for a quick return.

Following an accident, it was decided to adopt an improvision of the counterweight principle, which has already been worked out in tables showing the different tilting positions, and the corresponding tilting angle, leverage in feet, and moment in feet-tons, etc. This comprised a rope which passes over a cam sheave on the tilting trunnion of the converter, and from thence is connected to the counterweight. If for any reason it is desired to instantly return the converter to its initial position, there is always sufficient weight to enable the tipping moment to be overcome, and which is effected by simply pulling a lever.

Quite a different form of accessory is seen in the provisions made for heating the contents, instead of being solely dependent upon the heat of the reaction. One well established construction, instead of having the top open for emission of the gases, has a "roof" and separate short stack to allow egress of these gases. Around the top of this roof is a pipe-line with several connections, usually six in number, for permitting producer gas to impinge directly on the contents, and ensure these remaining in fully molten condition. The ends of this main pipe-line are connected to the gas supply at the trunnions, and in this way no difficulties are encountered when the converter is tilted to different angles. The work is thus not limited to handling charges which have a sufficiency of oxidizable material to provide the necessary heat, and the refining of the matte can be carried to a further stage, as has been described previously.

When the contents have reached the final stage, and the gas and air blast are no longer required, tapping is done through this same short stack by tilting in the usual manner. While this arrangement has been in use for many years for handling other mattes, besides research work mostly with nickel mattes, it has the disadvantage that when repairs have to be done, the whole of the roof has to be disconnected, attended to, and replaced. The ordinary converter is free from these troubles.

It was this feature which gave rise to the suggestion to substitute electric heating, so that fettling and repairs would not differ from conventional methods. While much has been made of the induction principle of recent date, sufficiently high temperatures can be attained by resistance heating. For this purpose, resistor bands are fitted within the lining, and when the charge no longer develops heat through oxidation reaction, electric resistance heating keeps the mass molten, while the air-blast continues to function in the normal way. When the matte is first exposed to the blast in the converter, the oxidation of iron sulphide can cause, within one minute, a rise of some 30° to 40° C. and which makes an allowance of some 10° C. by cooling off. While the matte diminishes in quantity as the slag increases, through disappearance of the iron sulphide, the heat increases, despite the chilling effect of the blast.

This has been worked out to show that while 3 lb. of slag with a capacity of 0.4 calorie per deg. replaces 2 lb. matte with a capacity of 0.14 calorie per deg., the heat capacity of the materials is increasing some 0.27 calorie for each per cent iron sulphide oxidized. Temperatures below 1,200° C. can increase to upwards of 1,400° C. but the chilling effects of the blast are greater at the higher temperatures, and as there is no more reaction heat to draw upon, the mass would solidify rapidly at the conclusion of normal refining practice, unless "artificial" heat is applied. The air blast has been allowed to continue at 500 cu. ft. per min. per ton of matte at 6 to 6½ lb. per sq. in., while the current applied to the resistors can maintain the lower temperature, and which was carried out for experimental runs. The size and capacity of the resistors to maintain a given temperature was supplied in tables by the makers. This gives but a brief outline of a converter accessory which has been the subject of intensive researches, although comparatively little has been published on it.

Lastly, a very small accessory, and one which might be passed over with a cursory glance, is the chute which leads the matte from the blast furnace to the converter. But this turned out to be of no small importance in handling the more complex cobalt mattes. Indeed, so much importance was eventually attached to this, that when new larger blast furnaces and converters were installed, a 60 ft. chute was deliberately used for the conveyance of all cobalt-bearing mattes.

Iron Ore from Nickel Ores

The International Nickel Company of Canada Limited has announced that it is undertaking the production of by-product iron ore from nickel ores in the Sudbury District of Ontario, where its mining operations are centred. The company is reported to be beginning immediately the construction of a $16,000,000 plant in the Copper Cliff area as the first unit in an operation which will ultimately yield about 1,000,000 tons of high-grade iron ore a year in addition to nickel from Sudbury ores.

A new process, developed by the company's research staffs made the undertaking possible and an important feature of the project is the resultant release of smelter capacity which permitted Inco to assume the five-year contract it recently signed with the United States Government for delivery of 120,000,000 lb. of nickel without diversion of regular supplies from industry. The new plant will, it is stated, supply iron ore higher in grade than any now produced in quantity in North America. Containing at least 65 per cent iron natural and less than 2 per cent silica, this ore will command a premium price for direct use in open hearth and electric furnace steel production in Canada and the U.S. By comparison, ore from the Mesabi pits of Minnesota contains 51.5 per cent iron natural. Initially the plant will treat 1,000 tons a day of nickel-bearing pyrrhotite removed from ore in the early stages of processing.

The new process, with its yield of iron ore, now makes possible the treatment of those lower grade Sudbury ores hitherto considered uneconomical. It is one of a series of carefully-planned developments by which the company's ore treatment processes are being revolutionized. Copper-nickel separation by controlled cooling and flotation of matte, and oxygen-flash smelting of copper-nickel concentrates, are two other recent and significant Inco developments. The Inco method is of great importance in opening the way for increased recovery of other elements.

A Review of Chromite Resources—II

In our issue of September 11 the first portion of this article discussed the position of the Union of South Africa as the world's principal source of chromite, and suggested that the article as a whole presented evidence which, in the long term, gave chromite producers no reason to fear the consequences of expanding production. In the concluding instalment which follows, the standing of other main producers, notably Southern Rhodesia, the U.S.S.R. and Turkey, is considered, while the position of the United States is the subject of interesting remarks.

Southern Rhodesia is the leading supplier of metallurgical grade chrome and has large refractory grade reserves. From the start of production up to December 31, 1946, the total value of the Rhodesian chrome output amounted to £11,718,680. Production was expanded from 139,083 tons in 1939 to the wartime peak of 335,000 s.tons in 1942. Last year's output was reported to be 861,839 s.tons but this exceptional figure is attributable to the inclusion of a 500,000 ton stockpile which had accumulated as a result of railway congestion. A new royalty rate, equivalent to nearly 4s. a ton at current market prices, came into force from July 1, 1953, in place of the old rate of 5s. per ton on chromite outputs exceeding 100 tons payable on shipments. When the new rate of royalty was announced the mining companies pointed out that, but for the railway transport bottleneck, all the accumulated ore would have been shipped and the old rate of royalty would have been paid on it. The Government accepted this argument and permitted declaration of the stockpiles at the old rate. It was ruled, however, that thenceforward all chromite outputs should be declared at the time of mining.

THE SOUTHERN RHODESIAN DEPOSITS

The chrome-ore deposits of Southern Rhodesia comprise three main groups: the deposits at Selukwe township; the deposits at Mashaba, and those of the Great Dyke. The Selukwe deposits have been responsible for considerably more than half the total output. Nevertheless, the extensive occurrences of high-grade ore along the Great Dyke have become increasingly important, more especially since the reduction in transport costs by the construction of a branch railway along the Umvukwe.

Analyses of Selukwe ore reveal C_2O_3 contents ranging from 40.10 to 54.27 per cent much of the ore analysed containing about 50 per cent. The ore is for the most part removed by open quarrying. Development is by means of adits driven into the hill and shafts sunk at the edge of the ore-bodies. After the stripping and removal of overburden, the ore is quarried in horizontal trenches about 20 ft. apart. The crude ore, as blasted, is broken by hand and sent to the railway for trucking. In one quarry the ore is particularly rich in chrome content, but owing to its more friable nature it becomes mixed with dirt. It is, therefore, put through a Hardinge mill and passed over shaking tables, when a high-grade product is obtained.

Underground mining is also carried on. The lenses of chrome ore are removed in slices 8 ft. thick from the top downwards. When a slice has been removed, wooden bearers and lagging are placed on the floor, the timbers which support the roof are blown away, and the roof drops on to the lagging. By this system of selective mining the removal of immense quantities of overburden is avoided, and the risk of covering up undiscovered lenses of chrome with overburden is reduced.

The deposits of the Great Dyke are worked in the Umvukwe area of the Lomagundi district, where chromite seams occur for a distance of about 70 miles. They are also worked in the Hartley district and at Lalapanzi. In the Lomagundi district seams vary in thickness up to 30 in., with an average of about 7½ in. It has been conservatively estimated from measurements of seams exposed in outcrop workings in this district that 200,000 tons of chromite are available for every 100 ft. in incline depth from each mile from north to south of the Great Dyke. In other words, taking the average width of the Great Dyke as 2¼ miles, an average of 200,000 tons can be obtained from every 2¼ miles of Great Dyke rock, no mine working exceeding 100 ft. in incline depth. These figures are based on data obtained for one small area and must not, of course, be taken as applying to the whole 300 miles of the Dyke.

Southern Rhodesia has never been able to meet the demand that exists for its metallurgical chrome, due mainly to the lack of rolling stock. Ore is hauled as much as 600 miles from the mines to the port of Beira, where a new quay, especially intended to facilitate the loading of chrome ores from Beira, was constructed last year. The Government of Southern Rhodesia is fully alive to the possibility that technologists might succeed in bringing inferior chrome up to the standard required for alloying purposes, and a large number of engines and trucks are on order or have been delivered.

The authors of the Paley Report consider that some expansion of the Rhodesian chrome output is possible, but would probably involve higher cost, since the production would have to come from thinner chromite seams. Improvement in rolling stock and power supplies, however, should have very favourable effects on production. The mining industry now seems confident that chrome will be moved with considerably less delay than in the past, for last year increasing interest in chrome propositions was reported. Properties that had lain unworked for years were being re-opened and new chrome deposits were being explored. A major development was the acquisition of the Seymour, Selundi and Bwana M'kuba mines by a London group which planned to spend £150,000 on a development programme. It was hoped to increase production of chrome concentrates from the present small scale to about 72,000 tons a year.

A development with interesting potentialities is the large-scale production of ferro-chrome, which is bound up with the projected hydro-electric schemes in the Zambesi basin. A pilot plant now in operation is capable of turning out between 5,000 and 7,000 tons a year of low-carbon ferro-chrome containing 70 per cent chromium.

INCREASED SOVIET OUTPUT

Shimkin considers[3] that as a result of continued rises in output since 1926, the U.S.S.R. may now be the world's largest producer of chromite. Between 1927 and 1935, and again since 1944, it has been a major exporter of the ore, but in 1951—for the first time for many years—the U.S.S.R. shipped no ore to the United States. Despite the abundance of domestic ores, inadequate electrical capacity, technological lag, and (until 1937) insufficient supplies of high-grade ore has forced the Soviets from time to time to rely primarily on imports of ferrochrome. Even in 1947, while low-chromium steels were numerous, only a few medium- and high-chromium steels were in actual production. On the other hand, chromite consumption for refractory and chemical purposes has always been high. Soviet chromite reserves are believed to be adequate to cover Hypothetical

Standard requirements for the entire Soviet sphere, and also to cover exports. In the light of available data Shimkin considers it safe to assume that they aggregate fully 25,000,000 to 30,000,000 tonnes.

WIDESPREAD TURKISH DEPOSITS

For many years Turkey was the world's leading producer of chromite, a position which it has evidently regained, for the 1951 output was 588,343 l.tons of crude ore. Turkish chromite is of metallurgical grade, much of it being high grade lump ore of the most desirable quality. The deposits are widespread throughout the country, but many are remote from transportation. Some deposits are veins and others are typical tabular masses. The largest deposits are in the Guleman district near Ergani in eastern Turkey, where reserves of high-grade ore were estimated some years ago at over 1,000,000 tons for the Guleman mines. Other important producers are the Karvek mine in the Eskisehir district, the Dagardi mine in the Kutayha district, and Fethiye mines on the south-west coast. Important new deposits have been found in the Taurus Mountains in south central Turkey. The majority of the mines are owned by the Eti Bank working under Government supervision.

The Turkish output could possibly be doubled or trebled through more efficient concentration of the large reserves of submarginal ore.[1] A major obstacle is the lack of transportation facilities, for rail transport is inadequate, and in many instances transport is by ox-cart. Assistance under E.C.A. and M.S.A. is contributing to the improvement of both concentration and transportation. In addition, a loan has been made by the International Bank for Reconstruction and Development for the improvement of port facilities.

The revival of Turkey's chrome mining industry is due partly to the keen demand from Free World importers and partly to recent changes in the mining laws, which have made chromite mining attractive to both domestic and foreign capital. Another stimulating factor is an agreement between the Marshall Mission and the Turkish Government whereby private producers are granted credit for the extension and exploitation of their mines. The number of mining applications received by the Turkish Trade Minister rose from 4,280 in 1950 to 6,790 in 1951, and to more than 8,290 in the first six months of last year.

Existing data do not permit a reliable estimate of existing reserves. Turkish reserves of high-grade ore are known to exceed 1,000,000 tons, and available evidence suggests that past estimates were probably low. It is reasonable to assume that reserves will be considerably increased during the next few years as a result of exploration and development with improved technical resources, together with improved transport and more incentives for private capital.

OTHER PRODUCERS

New Caledonia is the third largest producer of metallurgical grade chromite, the Tiebaghi mine being famous for its high-grade product. At Mount Tiebaghi the ore is found in veins and funnel-shaped columns extending deep into the peridotites and serpentines of the mountain mass. The Fantoche mine in this area was reported some years ago to be the deepest underground chromite mine in the world. Chrome-bearing sands are found on the west coast of the island and other ores requiring concentration are worked in the Noumea district. The island's high-grade ores were largely exhausted during the second world war, but concentration of low-grade ores has made possible an increase in output. Some further expansion of output is planned by several adequately financed groups. Reserves at currently active mines are not sufficient to permit any significant expansion, but in view of the island's numerous known deposits, it is possible that extensive prospecting would reveal more high-grade ore.'

The Philippines are the largest source of refractory grade chromite and produce lesser amounts of metallurgical grade ore. There are two chromite belts, one extending down the western sides of Luzon, Mindoro, and Panay Islands to north central Mindanao, and the other from south-eastern Luzon to north-eastern Mindanao. Five types of deposits have been recognized. At Masinloc in Zambales province, Luzon, is a unique deposit of refractory grade, assaying about 34 per cent Cr_2O_3, which is estimated to contain proved reserves of 10,000,000 tonnes, or about 90 per cent of the total measured reserves of the Philippines. Since only two-thirds of the known reserves of the islands are developed, there is considerable scope for expansion.

Another important producer is Cuba, whose resources—mainly of refractory ore—were drawn upon so heavily during the last war that further exploration is necessary to restore capacity. The Cuban deposits range in extent from a few tons to over 100,000 tons and appear to be distributed at random in the chromite-bearing zones.

Pakistan has substantial deposits of chromite, which are situated in and near Hindubagh in the Zhob and Quetta-Pishin district of Baluchistan. In the past 30 years a total of 600,000 tons of chromite has been mined and exported. The average chromium content is 47 per cent. The known reserves are small but the potential resources are probably large.

Yugoslavia's chromium reserves are placed at 1,500,000 tonnes, excluding large deposits recently discovered in south-west Serbia, which are estimated to amount to some 500,000 tons.

Chromite is also produced to a varying extent in a number of other countries, including India, Japan, Sierra Leone, Australia, Canada, Greece, and Portugal.

EXPANDED OUTPUT BY THE U.S.

During the year the United States succeeded in expanding domestic production to a peak of 145,259 tonnes in 1943, but thereafter output declined very steeply and in 1950 it amounted to only 367 tons. About the middle of 1951 there was considerable concern in the U.S. over the chrome ore supply, the estimated shortage being 25 per cent, but the commodity was never brought into the International Materials Conference. Because of the steel strike the U.S. consumption fell last year to 1,192,800 s.tons, compared with 1,215,386 s.tons in 1951, while domestic production rose to 20,000 s.tons against 7,000 tons the previous year. About the middle of last year the chromite consumers, in reporting to the Defence Minerals Administration, were able to give quite a favourable appraisal of the situation.

U.S. domestic production has been stimulated by the reopening of the ore buying station at Grants Pass, Oregon, and by the Government programme, which calls for purchase for stockpile of up to 200,000 l.tons of specification chrome ores or concentrates from domestic miners in lots of 5 tons or more. This policy is helping to keep up prices.

The authors of the Paley Report consider that under a normal competitive economy the U.S. reserves of exploitable ore are unlikely to be materially increased. The major reserve is in the layered deposits of the Stillwater complex in Montana, containing an estimated 3,000,000 tons of Cr_2O_3, of which 2,000,000 tons are inferred. The second largest reserve is in black sands along the Oregon Coast, containing from 2 to about 8 per cent Cr_2O_3, which can be converted to about 750,000 tons of 40 per cent concentrate (or 300,000 tons Cr_2O_3) with a Cr-Fe ratio of 1.5 to 1. Two-fifths of the black-sand estimate represents inferred reserves. Only a very small part of these resources will yield usable lump ore. The major obstacles to the increased use of the U.S. domestic deposits are price and metallurgy.

The Mouat Mines in Stillwater County, Montana, are being put into operation under a contract with the American Chrome Company, which is expected to yield some 900,000 tons of chrome concentrates during the next eight years. D.F.A. has also awarded a contract to the Kenai Chrome Company for the production of 13,000 l.tons of chromite from a deposit on the Kenai Peninsula of Alaska.

It was recently announced that a U.S. Bureau of Mines Investigation of the heat-resisting properties of chrome ores and concentrates from the Pacific Northwest had disclosed that some of these materials were suitable for making refractories.

OUTLOOK FOR CHROME

Early this year the U.S. Government stopped stockpiling and it seems that most consumers have now covered their requirements for 1953. Moreover, there appears to be a tendency to avoid commitments beyond the end of the year at current high prices. With world production increasing and buying pressure slackening, no further increase in the price of chrome seems indicated in the immediate future. From a long view, however, the outlook for producers is reassuring.

So long as the United States continues to be overwhelmingly dependent on foreign chrome ores, a condition of excessive accumulation seems remote. In the absence of any general recession producers should therefore be assured of a stable demand at economic prices, despite the completion of stockpiling programmes. In recent years there has been a close relationship between chromite consumption and steel production. Moreover, chromium is an important ingredient of stainless steel, the production of which is expanding more rapidly than steel output as a whole. The wider use of chromium is indicated by improved control of the carbon content of stainless steels, which promises expansion of high-temperature applications. Other bull points for chromite are the development of chromium carbides of desirable hardness coupled with resistance to oxidation and acid corrosion, and the proposed production of metallic chromium from ore electrolytically.

The authors of the Paley Report conclude that refractory ores will last for only 20 to 30 years at the present rate of consumption, while metallurgical ore will have to be augmented by large amounts of chemical ores within the next decade. Moreover, as the shipping grade reserves are depleted, the ratio of concentrates to lump ore will rise rapidly. The prospects of discovering large new deposits are regarded as "slim." Consequently the requirements for expanded production are technology and price.

The main world and U.S. reserves occur as layers in the lower parts of extensive sheetlike igneous masses some of which are tens of square miles in extent. The layers of chromite are a few inches to a few feet thick, continue over distances ranging from hundreds of feet to miles, and can be explored and developed in a manner similar to coal. Supplies have also been drawn from pod deposits which occur as irregular or lenticular masses of chromite scattered more or less at random through the country rock, and there has been some production from river or beach placer deposits.

There are also immense lateritic deposits formed by tropical weathering of peridote and serpentine. During weathering the small original content of chromite is concentrated in the residual iron-rich soil up to a content of 2 or 3 per cent Cr_2O_3. Soil blankets of this type cover hundreds of square miles in Cuba, the Philippines, French West Africa, the Celebes and the U.S.S.R. These lateritic iron ores present major metallurgical difficulties, but they also offer great incentives because in addition to the chromium they contain the world's largest reserves of nickel and possibly of cobalt, together with immense reserves of readily mineable low-grade iron ore. The authors of the Paley Report consider it inevitable that all four metals will be recovered from Cuban laterite within a decade or so. In the light of available knowledge, however, it is estimated that chromium from this source would be available only at three and a half to four times the present price.

On the other hand, it is considered that Oregon beach sands would become available at about one and a half times the present price, while nearly all the known U.S. domestic reserves would be available at three times the present price.

If the picture presented by these informed conclusions is reasonably accurate, chromite producers have no reason to fear the long-term consequences of expanding production. Regarded from a broader standpoint, there seems little danger that technological progress will be hampered by a critical shortage of chromium. The potential resources are vast indeed and their exploitation is unlikely to present problems which cannot be overcome by metallurgical knowledge under the stimulus of economic pressure.

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Mexican Metal Exports Jan.-June 1953

(From a Correspondent)

Puerto Vallarta, Jalisco, September 12.

The Mexican Association of Small Mine Operators has declared that as a result of impulse given to the mining industry by President Adolfo Ruiz Cortines's administration, it is estimated that from now (September) to the end of the year, production will be increased by 10,000 tons, valued at 10,000,000 pesos ($1,163,000).

Sr. Enrique Casas Alatriste, vice-president of the Association, stated that federal subsidies (in form of exemption from taxation) have aided small mining operations to the extent that lead, zinc and copper production for August increased by 2,000 tons, valued at 2,000,000 pesos ($232,600) and that this ratio will be maintained, if not improved, by year's end.

Meanwhile, export figures released by the statistical division of the Department of National Economy show that the principal common metals exported by Mexico for the first half of this year included lead, copper, zinc, mercury, bismuth and antimony. Total sales in round figures registered 424,000,000 pesos ($49,313,700).

Foreign shipments of lead in refined and impure bars totalled 104,432.8 tonnes, valued at 219,300,000 pesos ($25,503,000), with refined bars forming bulk of exports, and totalling 102,721.7 tonnes, valued at 204,800,000 pesos. Second in importance were copper exports in impure electrolytic bars, with a total volume of 22,994.6 tonnes, valued at 137,200,000 pesos ($15,957,300). Refined zinc shipments totalled 27,432.9 tonnes, valued at 54,800,000 pesos ($6,368,200). Other metals were metallic mercury, 289.2 tonnes, worth 7,600,000 pesos ($883,800); bismuth (impure bars) 124.5 tonnes, valued at 3,200,000 pesos ($372,100); and antimony, impure and refined, 318.9 tonnes, valued at 1,900,000 pesos ($220,900).

While in 1952 Mexico had exported laminated iron and iron alloys, there were no exports in this branch for the first six months of this year. Last year laminated iron exports totalled 10,037.1 tonnes, valued at 12,100,000 pesos ($1,407,200), while iron alloy ingots totalled 933.2 tonnes with a value of 1,200,000 pesos ($139,500).

The Prospecting and Commercial Exploitation of Oil in the United Kingdom

Although prospecting for oil is being carried out with increasing momentum in various parts of the United Kingdom, only one commercially productive oilfield, at Eakring, Nottinghamshire, has so far been discovered. The following article, a condensation of the booklet *Petroleum in England* published by the Anglo-Iranian Oil Co. Ltd., is an account of this search for indigenous petroleum. The article deals with British production of crude oil and gasoline, mentions the activities now taking place in the prospecting areas, and describes the strata at Eakring, as well as the methods of operation used on this productive oilfield.

Although oil has been worked on a small scale in England for many centuries, it was not until 1939 that a commercially successful deposit was discovered in this country. This was the Eakring field in Nottinghamshire, which has been considerably widened by refraction surveys since prospecting began in the area during the late 1930's. The surveys worked to the south and east of the Eakring dome, and finally established three other domes at Duke's Wood, Caunton and Kelham Hills, each of which has been found to contain commercially important quantities of oil.

The total production of the Eakring field last year was 55,171 tons of crude oil and gasoline, and since the prospecting operations of 1938-1942 the field has produced a total of 737,605 tons of crude oil and gasoline. The importance of the Eakring field may therefore be assessed from a comparison of these figures with the complete crude oil and gasoline production of the United Kingdom, which in 1952 was 55,375 tons and which totalled 747,551 tons from the period 1938-1942 until the end of last year. It is important to note that all the gasoline produced has come from Eakring itself, and that the entire output has been no more than 973 tons. Since 1945 the remainder of the United Kingdom's crude oil has been produced at Formby, in west Lancashire. Output from this field was 204 tons in 1952.

WIDE PROSPECTING ACTIVITIES

Following the discovery of commercial oilfields in east Nottinghamshire, prospecting activities in widely scattered parts of England have been carried on. Unfortunately, conditions have not everywhere proved suitable for seismic reflection so that refraction surveying—using the arc method—has been more widely used. The surveys so far completed have located several dozens of deeply buried anticlinal folds in carboniferous rocks, and many of these have been tested by drilling. In some areas the large scale injection of igneous rocks has eliminated the chances of producing oil, and in many other instances tests have revealed the sandstone reservoir beds to be very indifferently developed.

Analysis of the borehole data taken east of the Eakring area suggests that the Millstone Grit, an oil bearer at Eakring, peters to less than one-seventh of its original thickness at Kelham, until in Lincolnshire it disappears altogether. Indeed, throughout this latter county the oil has almost disappeared, save for a few small pockets preserved because of local traps.

In Leicestershire and in other districts of Nottinghamshire, oil-saturated grit sands of various series have been discovered, but in no instance has a deposit proved commercially attractive. This is because defects in the form of injections of igneous rock or a lack of structural closure in the bearing rock itself have produced a silty effect that has ruined what possibilities the deposit might have possessed.

More optimistic reports have been forwarded from the Midlands, South and North-West. In the Midlands a structure near Radcliffe-on-Trent was drilled last year by the N.C.B. in the course of normal coalfield exploration. This borehole penetrated a heavily-fissured igneous sill containing oil in fractures under low pressure only. This borehole has been taken over by the D'Arcy Company.

In the south exposures of oil sands have been noted along the Dorset coast from Osmington Mills, where there is also an oil seepage, to Warbarrow Bay, and also to Chilley and elsewhere near Pevensey in Kent. These indications prove that oil was generated in quantity in the Jurassic and Cretaceous rocks in the south, and it is hoped that oil-bearing structures may yet be found in this region.

HOPES OF OIL IN THE SOUTH

In addition to the Jurassic and Cretaceous prospects in the south there are possibilities of Palaeozoic oil over a wide area in south-central England, to the north of a line through the Mendips and Guildford. In this area folded Palaeozoic rocks occur below the Jurassic and Cretaceous, and oil may be accumulated in the concealed structures. Yet it must be emphasized that to date oil in commercial quantity has not been found in any southern England structures.

Other prospecting activities to the north of the Midlands and in Scotland have revealed no deposits of importance, with the exception of the Formby field in west Lancashire. Here 53 shallow holes have been drilled for production and information, of which eight still produce by pumping under vacuum and, after ten years, yield about 16 tons per month with a cumulative total of 8,659 tons at the end of 1952.

It therefore is apparent that the Eakring field is the only commercially applicable oilfield so far discovered in the United Kingdom.

The Anglo-Iranian Oil Company Ltd., working through its subsidiary the D'Arcy Exploration Co. Ltd., launched a major drilling programme as early as 1936 after the Petroleum Production Act (1934) had made it possible for a company to acquire exploration licences over large areas under attractive operating conditions. Although other companies were active in the search, the D'Arcy Exploration Company achieved the first major success by discovering the Eakring field. Indications that the carboniferous rocks of this part of Nottinghamshire were folded into a large anticline with its crest in the neighbourhood of Eakring village were followed up by refraction surveys and drilling operations. These disclosed oil in the sands of the basal coal measures and in sand horizons of the Millstone Grit Series, as well as in the Chatsworth and Kinderscourt Grits.

GEOLOGY OF THE EAKRING FIELD

Eakring No. 1 borehole penetrated the following succession of rocks, which is typical of the area: Keuper at 0-277 ft., Bunter at 277-880 ft., Permian at 880-1,179 ft., coal measures at 1,179-1,914 ft., Millstone Grit at 1,914-2,643 ft., and carboniferous limestone from 2,643 ft.

The limestone itself was subsequently drilled through at Well No. 146 in Duke's Wood, and lower carboniferous massive limestone was penetrated from 2,555-4,180 ft. Below the 2,880 ft. mark some 200 ft. of green igneous rock was present, and from 4,180-5,540 ft. red conglomerates

and sandstone alternated with thin fossilferous limestones. Below this, steeply dipping red conglomerates and sandstones continued to a depth of 7,200 ft., where dark grey phyllitic sandstones were found, with some fine grained grey quartzite and hard black shale at the bottom of the hole between 7,463 and 7,468 ft.

The sandstones vary greatly in quality. The porosity or percentage of pore space ranges from 0 to 20 per cent and the rate of fluid movement permitted by the rock structures ranges from almost nil to very great. Each sand shows slight perculiarities in the character of its crude oil and edge water, and a tendency is apparent for the oil to be somewhat heavier in the upper sands than in the lower. There is a further tendency for the oil in equivalent sand groups to be lighter at Eakring than in places further east such as Caunton and Kelham.

A typical analysis of crudes shows the rough rock crudes to have a specific gravity of 0.848 at 60 deg. F. Lower producing sand crudes have a specific gravity of 0.828 at 60 deg. F., and viscosities ranging from 15.09 at 70 deg. F. c.s. to 4.27 at 120 deg. F. c.s.

Well spacing was originally planned at 500 ft. between wells but, to obtain maximum production between 1939-1945, infilling wells were drilled giving an overall spacing of one well to 2½ acres on the Eakring field and one well to 3 acres on the Kelham and Caunton fields. Initial well production varied from about 1 ton to an exceptional 50 tons/day, the average being about 8 tons/day.

THE DRILLING OPERATIONS

Throughout the operations in the Eakring field rotary drilling has been employed. The introduction of modern American methods has led to improvements in speed and a reduction in costs. The American equipment employed consists of a unitized rig and jack-knife portable 87 ft. mast, the whole being designed for maximum mobility, and for a drilling depth of 5,000 ft. The drill pipe is 4½ in. diameter, and the rigs are powered either by two semi-diesel 169 h.p. engines running at 1,300 r.p.m. or by two 150 h.p. electric motors. A slush pump with a 12 in. stroke, 6¼ in. bore operating at 60 strokes per min. delivers approximately 440 gal./min.

Where formation conditions are known, the present operational practice is to drill a 8⅝ in. hole from the surface to the top of the oilsand, and then to run a 6⅝ in. string of casing to the bottom of the hole and cement it in that position. A non-return valve near the bottom of the casing-string prevents the heavier cement flowing back into the casing when pressure is released after pumping. The hole is then cleared out by running a 5¼ in. bit to the bottom, the mud in the casing being replaced by clean mud or oil before drilling to the base of the oilsands is begun.

A 4½ in. steel tube liner, perforated with ½ in. holes staggered at approximately 6 in. intervals, is then run into the well to prevent the sides of the hole collapsing. Fireclays, the seat earths of coal seams, are very liable to disintegrate in the presence of oil, and after running the liner any broken rock material inside it is cleaned out by running a string of 2 in. tubing into the hole and circulating it to clean the bottom.

Subsequently the hole is baled down until fresh oil starts to flow in through the perforations. A pump attachment on the end is lowered almost to the bottom of the hole and the well is ready for the pump installation.

Although the gas/oil ratio on the fields is small, the well-head gas is collected from the annulus between the casing and production tubing in each well and from the water separators situated in the Eakring end of the field. Formerly 160,000 cu. ft. of gas were treated each day, but the figure has now fallen to 20,000 cu. ft.

REVIEWS

The Rocks of the Sekondi Series of the Gold Coast, *by A. T. Crow, B.Sc., A.R.C.S., F.G.S. Published under the authority of the Government of the Gold Coast. Gold Coast Geological Survey Bulletin No. 18. Pp. 74 with maps and photographs and with coloured maps and sections. Price 7s. 6d.*

The author of the work under notice describes the results of the mapping of the Sekondi Series on the Gold Coast. This area is of particular interest at the moment, as the Sekondi-Takoradi region is currently undergoing intensive development with extensions being made to Takoradi harbour and to the railway system, while industrial and commercial installations and new housing estates are being built and others are projected. The marked lithological variation between the various members of the Sekondi Series has profound significance in the development of the area.

The Series comprises gently dipping sedimentary rocks exposed in cliff sections along the coast at many points between Takoradi and Elmina. It is evident that the Series is composed of Upper Palaeozoic rocks, although no precise age can be assigned to them. The work is concluded with a detailed description by areas, and the whole comprises a valuable report.

Year Book and Guide to Southern Africa, 1953 Edition.—*Edited by A. Gordon-Brown, F.R.G.S., for the Union-Castle Mail Steamship Company Ltd. Published by Robert Hale Ltd. Pp. 900 with maps and index. Price 9s. 6d. net. By post 10s. 6d.*

Year Book and Guide to East Africa, 1953 Edition.—*Edited by A. Gordon-Brown, F.R.G.S., for the Union-Castle Mail Steamship Company Ltd. Published by Robert Hale Ltd. Pp. 450 with maps and index. Price 7s. 6d. By post 8s. 2d.*

The former of these two volumes deals with the Union of South Africa, Northern and Southern Rhodesia, South West Africa, Basutoland, Bechuanaland and Swaziland. The latter volume deals in detail with Kenya, Uganda, Tanganyika, Zanzibar, Nyasaland, Portuguese East Africa, the Sudan, Mauritius, Egypt, Eitrea, Somaliland, Ethiopia, the Congo, Madagascar, Reunion and the Seychelles.

Although the matter presented in the volumes is mainly of interest to potential tourists, interesting facts are presented in connection with industry, and in the Southern African edition quite comprehensive notes on South African gold mining are given. Two useful handbooks for travellers.

Colliery Year Book and Coal Trades Directory, 1953.—*Thirty-first edition. Published by the Louis Cassier Co. Ltd. Pp. 944. Price 30s. net (by post, 31s. 3d.).*

In keeping with the traditions established by its predecessors, this volume presents in readable and convenient form information of the coal mining and allied industries. The whole work has been thoroughly revised and new features have been introduced, although the general layout follows the patterns of past editions.

The contents include information on Ministry organizations, personnel, coal mining, executives, trades directives, mines regulations, safety statistics and all subjects relating to the industry, while in addition some facts and figures on coal mines in Western Europe have been introduced. The instructive foreword is by the Rt. Hon. Geoffrey Lloyd, M.P., Minister of Fuel and Power.

Heavy-Media Separation Processes for Mineral Concentration.—*Published by the Mineral Dressing Division of the American Cyanamid Co. Pp. 32. Free of charge.*

This latest bulletin from Cyanamid Products Ltd. (London) includes in its pages descriptions of representative heavy-media plants treating a variety of metallic and non-metallic ores, includes listings of plants currently in operation as well as planned, and in addition contains a complete biography on heavy-media separation.

This is an interesting publication, that is neatly produced with a scattering of illustrations in half-tone and line.

MACHINERY AND EQUIPMENT

Reduction of Colliery Costs by Chemical Sprays

Productivity in coal mines in the United States may be aided by the development of special chemical compounds for use in mines, according to a report in *Chemical Week*. One of these is used to seal stoppings, the partitions constructed to close off inactive mine openings and keep fresh air circulating; the other is used to seal mine roofs against moisture and prevent caving in. The chemicals employed are familiar, including vinyl and asphaltic compounds, acrylates, and various types of adhesive binders. They are applied as plastic sprays or by brush. Such chemicals, if used in mines, must be both non-toxic and non-inflammable. It is, however, possible to meet both these requirements. For example, a chemical mine roof sealer, known as "Ruflock," has been approved by the appropriate authority which would prohibit the use of hazardous mine-sealer compounds.

Typical vinyl and asphaltic compounds, sprayed under pressure on a stopping made of concrete or cinder block and mortar, are said to save almost 50 per cent of circulated fresh air that normally escapes through a concrete stopping. A test in one mine showed that this type of coating saved thousands of dollars in power costs by reducing the load on fans in the ventilation system. Plastic coatings are said to be equally effective on temporary stoppings made of canvas or brattice cloth secured to wooden frames. On occasions, these sealing sprays make it possible to substitute temporary stoppings for costlier masonry ones, and to save the time needed to build masonry walls.

Similar materials seal mine roofs against contact with air and moisture, and thus prevent the deterioration that can cause roofs to fall. The effectiveness of this application depends on the nature of the coal deposit. However, one operator who applied a coating of asphalt-base material to a mine roof, reported that the application was effective and that it cost only 1 per cent as much as the previous method of keeping passages clear of falling rock and properly shored.

A Boring and Prospecting Tool

A light and compact boring rig for putting down holes in alluvial ground is stated by the manufacturers, The Climax Rock Drill and Engineering Works, Ltd., to weigh only 50 lb. It is thus suitable for prospectors, geologists and engineers, as it can be carried and manipulated by one man. Named the Mackintosh Boring and Prospecting Tool, the unit can penetrate ground to the hardness of solid chalk, and core samples may be taken from all but the hardest rock, such as granite. Penetration through rocky or very stony ground is not possible with the Mackintosh.

The principle of the tool lies in the fact that coherent sands, clays, brick earth and the like, tend to flow laterally under pressure or blows. This principle is taken advantage of in driving piles, that is, as long as the impacts on the pile are frequent a flow is set up in the ground penetrated. But if the pile be allowed to stand, the flow is reversed and the strata closes around the pile to render it almost immovable under renewed impacts. The total frictional surface of the Mackintosh Tool (16½ sq. in.) at 50 ft. shows that friction between this tool and the ground has been reduced to the minimum, while rigidity has been maintained.

The tool can put down 20 holes between 20 and 30 ft. depth in one day. A core sample may be brought up from any desired depth, and a sample of water from any particular stratum may be obtained without fear of contamination from water or other levels. The diameter of the holes bored is 1 in. and an advantage is that the tool may be used in the same way for horizontal and upward borings, and requires 4 ft. of operating space.

The tool consists of a series of 4 ft. x ½ in. diameter rods coupled together with barrel-shaped nipples 1 in. in diameter, the nickel steel driving point is of the longitudinal stream line section, with a major diameter of $1\frac{1}{16}$ in. The actual boring is effected by the lifting and driving tool. This tool, when the arms are folded, will pass over the driving point rods and nipples, but when the arms are brought down into alignment the jaws grip the rods firmly and by bearing down on the arms the rods enter the ground by reversing the position of the tool, the rods can easily be withdrawn.

Where very rough ground is encountered, the hammer tool is used. This consists of a hammer and tube, inside which is a sliding hexagonal plunger that is screwed on to the uppermost boring rod. The hammer head is then moved up and down impinging on the hexagonal plunger which easily and rapidly hammers the rods into the ground. A solid steel nut is supplied which may be screwed on to the rods, and a sledge hammer used, but the former method is better and quicker.

Versatile Die Grinder Kit

In introducing a new die grinder kit type DG1, Wolf Electric Tools Ltd. are satisfying a need for a handy versatile tool at low cost to undertake a variety of jobs in tool rooms, machine shops and maintenance departments. The powerful driving unit has a capacity for grinding wheels up to $1\frac{1}{8}$ in. dia. x $\frac{1}{16}$ in. and has a speed, running light, of 16,000 r.p.m. The input on full load is 270 watts and its net weight is 5lb.

Although primarily intended as a portable tool, the DG1 may be mounted in a bench clamp stand for stationary use. High tensile aluminium alloy is selected for the motor frame which is finished in attractive polychromatic stove enamel, and dust sealed ball bearings are used throughout. The double pole switch is of ample capacity fitted with a retaining button. Armature and field windings are enamelled and double sink covered copper wire, and the armatures are dynamically balanced to high precision limits by electronic methods.

The complete kit comprises the high speed DG1 grinder with 10 ft. of 3 core T.R.S. cable, spare set of carbon brushes, a carefully chosen set of mounted points, grinding wheels, and felt bobs and arbors completely housed in a specially designed steel carrying case. The outfit provides an efficient method for grinding down contours, correcting inaccuracies in dies, light profile grinding, retouching taps, cutters and forming tools, and similar tasks. A wider selection of rotary files and milling cutters for use on non-ferrous metals is available to suit special requirements.

A Comprehensive Machinery Catalogue

The first comprehensive post-war catalogue of machinery and equipment in the stocks of George Cohen, Sons and Co., Ltd., has been published for the first time since 1939. The company intimates that further editions will follow three or four times a year. The traditions of the company during the pre-war years will thus be maintained.

The catalogue is in seven sections, under the following headings: machine tools and sheet metal working machinery, power and electrical plant, boilers and heating, process plant, stainless steel equipment, hydraulic plant for rubber and plastic moulding, and contractor's plant. There is a detailed index of plant and machinery, and the whole is well illustrated.

The portion of the catalogue which perhaps offers most equipment of interest to the mining engineer is that devoted to modern contractors' plant. The units described include Rushworth derrick cranes, Jones KL mobile cranes, Bray hydro-loader equipment, and grabs, together with hammers and dumpers of different types. Pumps receive prominent mention.

A Differential Draught Gauge

A development in the range of instruments manufactured by George Kent, Ltd., for assisting combustion control is the Differential Draught Gauge, which was fully described in our issue of September 18. It should be emphasized that an accuracy of ±2 per cent of maximum differential head is guaranteed, and that the instrument is capable of measuring up to 30 in. w.g. differential head.

METALS, MINERALS AND ALLOYS

There is still no evidence of any major fall buying in the United States and consumers continue to mark time. Under these circumstances the metal markets generally remain quiet.

COPPER.—Prices have remained steady both in London and New York since our last issue. Perhaps the most significant item is the large increase in refined stocks outside America as shown in the report of the Copper Institute for August. According to these statistics the U.S. output of crude was 82,705 s.tons (88,063 in July) and of refined 106,749 s.tons (112,570 in July). Deliveries were 106,985 s.tons (104,481 in July) whilst stocks increased 1,725 s.tons to 78,825 s.tons; thus in the United States there was little change. Outside the U.S. copper production is computed at 124,476 s.tons (128,838 in July). The main change, however, was in deliveries to consumers which fell to 43,908 s.tons from 68,336 in July with the result that refined copper stocks increased to 209,220 s.tons against 166,430 a month earlier. This may reflect the steadily growing Chilean stocks. Formal negotiations between the United States and Chile opened this week, and as suggested in our last issue, may be protracted as the price and quantities offered have to be settled as well as any conditions which the U.S. may impose. It appears likely that the Chilean metal will go to the stockpile especially in view of the latest statement by the U.S. Defense Mobilization Director referred to in "Notes and Comments." The transaction will also involve discussions with the American copper companies operating in Chile, and possible competition for government support for the A.S. and R.'s Toquepala copper project in Peru where reserves are estimated at some 350,000,000 tons of +1 per cent copper and a projected output of 100,000 tons of refined copper yearly when in production. The workers at Potrerillos and Chuguicamata have voted for a strike.

LEAD.—The price has appreciated on the Metal Exchange slightly since July last and there have been no changes in the U.S. quotations. The background, at any rate as reflected in statements by producing interests anxious to strengthen the U.S. tariff wall, is not particularly encouraging for the future. Mr. Andrew Fletcher, President of the A.I.M.M.E., and of the St. Joseph Lead Company, in an address to the Canadian I.M.M. earlier in the month, said, "it is apparent that the world production for lead and zinc for at least five years past has been considerably in excess of world consumption." He is reported as estimating that the U.S. Government stockpile in the case of both lead and zinc must be between 800,000 and 1,000,000 tons with the British Ministry of Supply holding over 150,000 tons. On the question of what restriction on imports of lead and zinc, if any, should be imposed, there is great divergence in U.S. views. The National Lead and Zinc Committee would like a quota of 300,000 tons of lead and 300,000 tons of zinc imposed. Mr. Fletcher prefers a sliding scale import tax and Mr. S. D. Strauss, of the A.S. and R., points out that a flexible duty would not be needed with a strong foreign market, and should this be weak the result would be rapidly alternating quarters of high and low prices which would encourage consumers to have resort to substitutes like aluminium where price stability is to be expected.

TIN.—There is little change to note in regard to tin. The market here has continued the improvement developed at the end of last week on the reduction of the bank rate, while in the United States the expectation of a dock strike has lead to a rise in the price to 83.75 c. for prompt but more distant positions are neglected. There is no sign of curtailment of production. According to the Hague's statistics, production of concentrates in July rose to 16,100 tons, compared with 13,900 tons in June; the large increase in Bolivian exports at 4,082 tons was an important factor. Smelter output is given as 16,400 tons (13,500 tons in June); Straits smelters' output being 5,906 tons, that of the U.K. 3,289, the U.S. the conventional 3,000 tons and the Netherlands estimated at 2,000 tons. Stocks in the U.K. at the end of July are given as 9,100 tons and Malaya 6,000 tons. U.K. consumption is put as 1,328 in July (1,519 in June).

The contract between the R.F.C. and the Bolivian Government for the sale of minerals and tin concentrates noted last week, apparently still awaits the signature of the United States administrator but this presumably is only a formality. The Bolivian Mining Corporation has announced that the contract provides for delivery of 10,000 s.tons of tin concentrates to Pacific Coast ports by March 31 next, at prices based on New York quotations, and that there are already 5,000 tons ready for shipment to Texas smelters at the ports, the output of medium and small mines. The heavy Bolivian exports for July printed above may reflect the outcome of the prolonged negotiations. Arrivals of Bolivian concentrates in the U.K. continue heavy: in August they were 5,339 tons and for the eight months totalled 31,331 tons. August production in Malaya was again high at 4,506 tons, in Indonesia 2,945 tons, and in the Congo 1,057 tons.

ZINC.—The price of zinc has improved this week on the Metal Exchange, especially for prompt material. Latest reports from New York are much more cheerful, custom smelters report a fair demand while leading producers say that sales are splendid in all grades; prices on Wednesday, however, were quotably unaltered. Mr. Andrew Fletcher speaking at the Seattle meeting of the American Mining Congress estimated imports of unwanted zinc into the U.S. this year at 317,000 s.tons.

ALUMINIUM.—The President of the Reynolds Metals Co. foresees some lessening in demand for aluminium after the beginning of next year, and the necessity for producers to get to work to sell all the metal of which production capacity is capable.

The U.S. Defense Mobilization Board has postponed Government backing for a third round of aluminium expansion, following on requests for financial assistance by Olin Industries Inc. and the Wheland Company of Chattanooga, whose plans for entry into the list of U.S. aluminium producers now appear to be in the air. Steady progress is reported in the construction of Anaconda's aluminium plant at Colombia Falls, Montana; some 200 pots are scheduled to be in produtcion by the end of next year, and full capacity output of 52,000 s.tons of metal should be reached in 1955.

The strides which aluminium is making in the building trade, is emphasized by the completion of the Alcoa 410 ft. aluminium skyscraper in Pittsburg comprising thirty storeys, all electric wiring and most of the plumbing is aluminium as are the lifts, partition framing, etc.

U.K. PRIMARY METAL STATISTICS—JULY
(long tons)

	Refined Copper			*Lead†*			*Slab zinc*			*Tin metal*		
	July 1953	*Jan.-July* 1953	*Jan.-July* 1952	*July* 1953	*Jan.-July* 1953	*Jan.-July* 1952	*July* 1953	*Jan.-July* 1953	*Jan.-July* 1952	*July* 1953	*Jan.-July* 1953	*Jan.-July* 1952
U.K. stocks beginning period	130,047§	91,548§	87,251§	26,868‖	23,090§	77,167§	31,661§	166,050§	39,659§	3,511§	4,225§	8,004§
Imports	23,650	132,509	137,794	11,298	95,321	95,932	6,726	98,002	138,867	22	911	2,419
Production	4,178	51,319	93,547	6,887	44,466	50,252	5,534	41,511	38,066	3,289*	15,919*	17,002*
Consumption	14,698	127,788	215,808	17,123	125,157	109,122	13,140	100,312	105,525	1,328	10,648	13,666
Exports and Re-exports	Nil	956	362	2,110	13,637	409	495	6,307	92	1,719	7,286	16,883
U.K. stocks end period ‡	139,721§	139,721§	89,278§	25,820‖	25,820§	116,480§	34,609‖	34,609§	106,112§	3,749§	3,749§	4,789§

(Source : British Bureau of Non-Ferrous Metal Statistics)

*Estimated by International Tin Study Group. †Includes imported virgin lead and English refined from domestic ore and secondary metal. §Including any Government stocks other than strategic reserves. ‖Excluding Government held stocks. ‡In addition U.K. stocks of blister copper at the end of July were 58,888 tons; of zinc concentrates were 54,467 tons; and of tin in ore were 3,328 tons.

ASBESTOS.—The Philadelphia paper, *Asbestos,* reports demand for all grades of fibre as continuing at a very level rate, though there has been some reduction in pressure for spinning fibre and a slight easing in the demand for shorts.

COBALT.—Consumption of cobalt in the U.S. in June, according to the U.S. Bureau of Mines Report, showed a 10 per cent decline on the figures for the previous month, due chiefly to the smaller employment of the metal for high temperature alloys, on the other hand more was consumed for magnet alloys. Imports, including 96,090 lb. from Norway, were about 10 per cent higher. Total consumption for the first half of the year was at a slightly higher rate than in 1952, and amounted to 5,956,277 lb. for the first half year as compared with 10,818,493 lb. for the whole of 1952.

NICKEL.—Reports from Toronto indicate the possible appearance of a new nickel producer in the shape of Nisto Mines, Ltd., which has located a nickeliferrous orebody west of Lake Athabasca. The orebody is said to have been traced for over 2,400 ft. but is low grade, preliminary sampling showing 1.17 per cent n.i. and 0.5 per cent c.u. in widths up to 20 ft.

MOLYBDENUM.—Production of molybdenum in the United States continues to show a rising tendency. Output in June was 26,503,000 lb. and was above the monthly average for any year since 1943. Shipments this year have been slightly above the output figures but despite this stocks have increased.

QUICKSILVER.—The outlook for lower quicksilver prices already indicated has been further emphasized this week. It is stated from New York that the U.S. has accumulated all the quicksilver it needs for the national stockpile and does not intend to buy any additional quantities. A sharp drop in consumption is also anticipated as the exceptional need for its use in the construction of chlorine plants is over, and it is estimated that consumption may drop 40 to 50 per cent in the current half year below the rate in the second half of 1952. An annual consumption rate of some 45,000 flasks is forecast by the trade for which Yugoslav metal (say 15,000 flasks), and Mexican (say 12,000) added to the domestic supply should suffice. The U.S. price is now called $184-187 with Mexican material available down to $177.

TUNGSTEN.—There is nothing fresh to note in the U.K. market this week. In New York the open market price was lowered on Tuesday to $41-42 per s.t. unit, c.i.f. U.S. ports.

GOLD.—South African output in August was 1,017,409 f.oz., compared with 1,030,089 f.oz. in July and 997,099 f.oz. in August, 1952. Of the total declared last month the companies in the Chamber of Mines organization contributed 930,794 f.oz., and those in the Free State 44,632 f.oz. Outside mines in the Transvaal yielded 41,983 f.oz.

PLATINUM METALS.—There has been a general revision in the prices of the platinum metals in the U.S. since the figures given in our issue of September 11. Platinum is still stabilized at $92-93 per oz. as is rhodium at $125 and palladium at $22½. Osmium, however, has been cut to around $145 and iridium to around $182½, these revisions are said to be due to the market practically drying up.

The London Metal Market

(From Our Metal Exchange Correspondent)

During the past week American buying of tin has been more marked, both in Singapore and in London, and this has imparted a more healthy undertone to the market. The Eastern price on Thursday morning was equivalent to £640⅜ per ton c.i.f. Europe.

The demand for copper continues good from all directions, but no worthwhile appreciation of the situation can be arrived at until the present American/Chilean negotiations are concluded. Buying by U.K. consumers has been better recently, as is evidenced by the growing demand for cash metal which has to be supplied by the Government Broker. These sales have taken place at a small premium over the cash quotation, which is justified by the Ministry allowing the buyer to have the option of taking the shape of copper desired instead of this being in the seller's option as laid down in the standard contract.

The demand for nearby lead has increased, and this, combined with some delays in steamers bringing metal to this country, has resulted in a general price rise.

The outstanding feature of the zinc market has been the extreme shortage of metal for September settlement, and the backwardation now stands at its highest level since the market settled down after its reopening. It cannot be said, however, that the demand either here or elsewhere has improved, and it is doubtful whether the recovery will continue after the existing technical situation has been cleared up.

Closing prices and turnovers for the week are given in the following table:

	September 17		September 24	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Tin				
Cash	£605	£607½	£622½	£625
Three months	£595	£597½	£607	£608
Settlement	£605		£622½	
Week's turnover	620 tons		530 tons	
Lead				
Current month	£89¼	£90	£92¾	£93
Three months	£86⅛	£86¼	£88½	£89
Week's turnover	5,950 tons		4,825 tons	
Zinc				
Current month	£68¼	£68½	£70½	£71
Three months	£67½	£68	£68½	£69
Week's turnover	4,850 tons		4,050 tons	
Copper				
Cash	£232½	£235	£237½	£242½
Three months	£218	£218½	£224	£224½
Settlement	£235		£242½	
Week's turnover	2,900 tons		4,050 tons	

SEPTEMBER 24 PRICES

COPPER, TIN, LEAD AND ZINC

(See our London Metal Exchange report for Thursday's prices)

ANTIMONY

English (99%) delivered, 10 cwt. and over .. .. .. £225 per ton
Crude (70%) .. .. £210 per ton
Ore (60% basis) .. .. .. 20s. — 22s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade) .. .. £483 per ton

OTHER METALS

Aluminium, 99·5% £150 per ton
Bismuth (min. 4 cwt. lots) 16s. 6d. lb.
Cadmium (Empire), 13s. 10d./14s. 4d. lb.
Chromium, 6s. 5d./7s. 6d. lb.
Cobalt, 20s. lb.
Gold, 248s. f.oz.
Iridium, £60 oz. nom.
Magnesium, 2s. 10½d. lb.
Manganese Metal (96%-98%) £280/£295
Osmiridium, £40 oz. nom.
Osmium, £65/70 oz. nom.
Palladium, £7 15s./£8 10s. oz.
Platinum, £27/£33 5s.
Rhodium, £42 10s. oz.
Ruthenium, £25 oz.
Quicksilver, £64 15s. ex-warehouse
Selenium, 30s. 6d. nom. per lb.
Silver 74d. f.oz. spot and f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 40% 6s. 3d. lb. c.i.f.
30% 5s. lb. c.i.f
Chrome Ore—
Rhodesian Metallurgical (lumpy) £14 8s. 0d. per ton c.i.f.
„ „ (concentrates) £14 8s. 0d. per ton c.i.f.
„ „ Refractory £14 0s. 0d. per ton c.i.f.
Baluchistan Metallurgical .. £16 11s. 6d. per ton c.i.f.
Magnesite, ground calcined .. £26 - £27 d/d
Magnesite, Raw .. .. .. £10 - £11 d/d
Molybdenite (85% basis) .. 103s. 10½d. per unit c.i.f.
Wolfram (65%) .. .. .. World buying nom.
„ „ .. .. .. 310s. nom. U.K. Selling
Scheelite .. .. World buying nom.
„ .. .. 300s. nom. U.K. Selling
Tungsten Metal Powder (98% Min. W.) .. .. 24s. 3d. nom. per lb. (home)
Ferro-tungsten .. .. .. 21s. 4d. nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £35 13s. 9d. d/d per ton
Ferro-manganese, home .. .. £49 15s. 0d. per ton
Manganese Ore Indian c.i.f. Europe (46%-48%) .. .. .. 7s. 11d. - 8s. 7d. per unit
Brass Wire .. .. 2s. 5¾d. per lb. basis
Brass Tubes, solid drawn .. 1s. 10d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The main feature of interest in markets this week was the change in the bank rate from 4 to 3½ per cent. This took place on Thursday last week as we went to press. This alteration caught the market by surprise and even now the dust has not settled. The immediate effect, as was to be expected, was a big jump in gilt-edged stocks, particularly in "undated" securities. Elsewhere, all good quality preference and debenture stocks rose and there was also some adjustment in the equity market. The change is probably due to the imminent Government funding operation and also for the purpose of easing the re-sale of steel stocks to the public. Following the alteration, the £ abroad was harder. Last week's revenue figures were not so good as previously, but the overall position remains well ahead of last year. For the first week for some time the national savings showed an improvement. After the exceptional stimulus of the bank rate change some reaction was to be expected and this took place later. The undertone, however, remains firm and when some of the pending new issues are out of the way markets should settle down again.

In Kaffir shares some temporary revival took place on Thursday and Friday, but this was short-lived, and the decline continued. Johnnies fell on the directors' statement and further realization of how heavily the company is committed in financing the Freddies group. It is anticipated that still further money will be required and that it will take several years to pay off the debts after the mines have started production. Randfontein were down following selling from Paris, and West Driefontein also turned easier; the latter was in some measure due to rumours of fresh water trouble later proved to be unfounded. There was also, however, some selling of West Driefontein from Johannesburg, probably in connection with recent Stock Exchange failures there. West Witwatersrand reached their lowest level for this year. Political developments in the Union and riots in Durban did little to assist the market.

The O.F.S. section was overshadowed by the renewed emphasis on the cost of bringing mines into production. Rumours regarding the flotation of the Saaiplaas mine did little to encourage a market already overburdened with problems for raising fresh money. It is believed that this may take place before the end of the year under the aegis of Consolidated Goldfields. The property lies between President Steyn and Harmony. Free State Geduld also fell on vague rumours of renewed trouble in the khaki shale area.

West African shares remained quiet. The market expects the coming dividend of Ashanti to be unchanged in view of the increased profits for the current year. The position of Bibiana is less certain. The lower returns from Ariston are thought to be a temporary factor and are expected to improve next year.

Diamonds were better but there was little doing and price changes in the list below are rather deceptive. The harder tendency was mainly on local demand.

Coppers were rather uninteresting and easier. Rhodesia Katanagas, however, were active and jumped to 15s. after the latest borehole results which gave details of rich values and a new vein system. Later, profit-taking set in. The steady copper price did little to stem the general drift and any setback for the metal might be expected to have an accentuated effect on share prices.

Eastern tin share failed to consolidate all their earlier improvements. In a slow market Southern Kinta were good on the report and maintained dividend. Tekka Taiping, however, fell on disappointing results and the fear that the dredge may be closed down. Amalgamated Tin of Nigeria declared a maintained dividend but the profits were up by nearly £500,000 before tax. Beralts were easier on balance due to the lower wolfram price.

Elsewhere, Wankie new ordinary shares were quoted at 11s. 1½d. in their fully paid form, equivalent to 1s. 1½d. premium. The debentures were up to 1 per cent premium on £20 paid.

FINANCE	Price Sept. 23	+ or — on week
African & European	2	.....
Anglo American Corpn.	5 13/16	-1/16
Anglo-French	17/6	—3d
Anglo Transvaal Consol.	21/3	.....
Central Mining (£1 shrs.)	28/1½	.....
Consolidated Goldfields	47/9	—3d
Consol. Mines Selection	23/9	.....
East Rand Consols	2/6	.....
General Mining	3½	-1/16
H.E. Prop	37/6	—7½d
Henderson's Transvaal	7/3	.....
Johnnies	51/6	—2/-
Rand Mines	3 1/16	+1/16
Rand Selection	30/-	—7½d
Strathmore Consol.	27/6	—2/6
Union Corp. (2/6 units)	26/6	—3d
Vereeniging Estates	3¼	.....
Writs	33/1½	+7½d
West Wits	38/9	—7½d
RAND GOLD		
Blyvoors	38/3	—3d
Brakpan	10/6	.....
City Deep	17/6	—7½d
Consol. Main Reef	19/4½	.....
Crown	33/1½	.....
Daggas	3 11/16	-1/16
Doornfontein	20/-	.....
Durban Deep	33/9	—1/3
E. Daggas	13/-	—3d
E. Geduld (4/- units)	29/4½	—7½d
E. Rand Props	2 1/16	-1/16
Geduld	4 1/16	.....
Govt. Areas	12/-	.....
Grootvlei	21/3	—3d
Libanon	9/-	.....
Luipaards Vlei	20/9	—3d
Marievale	18/9	+3d
Modderfontein East	17/6	.....
New Kleinfontein	18/1½	.....
New Pioneer	16/-	—3d
Randfontein	37/6	—1/-
Robinson Deep	10/9	.....
Rose Deep	12/-	.....
Simmer & Jack	4/7½	—1½d
S.A. Lands	20/7½	.....
Springs	4/3	+1½d
Stilfontein	24/9	—1/-
Sub Nigel	2 1/16	-1/16
Van Dyk	5/3	—3d
Venterspost	12/3	.....
Vlakfontein	13/3	.....
Vogelstruisbult	29/9	—1/-
West Driefontein	6¼	-1/16
W. Rand Consolidated	2 1/16	-1/16
Western Reefs	2 1/16	-1/16

O.F.S.	Price Sept. 23	+ or — on week
Freddies	8/6	—3d
Freddies N.	8/6	—3d
Freddies S.	8/3	—3d
F. S. Geduld	2 1/16	.....
Geoffries	14/-	+3d
Harmony	20/1½	—1½d
Loraine	7/3	—6d
Lydenburg Estates	11/3	—3d
Merriespruit	8/-	.....
Middle Wits	14/3	—6d
Ofsits	33/1½	—7½d
President Brand	26/3	.....
President Steyn	22/-	.....
St. Helena	12/-	.....
Virginia Ord.	11/3	.....
Welkom	17/6	+6d
Western Holdings	3 3/16	.....
WEST AFRICAN GOLD		
Amalgamated Banket	1/10½	.....
Ariston	6/1½	.....
Ashanti	23/3	.....
Bibiani	5/7½	.....
Bremang	2/3	.....
G.C. Main Reef	3/9	+1½d
G.C. Selection Trust	6/4½	.....
Konongo	2/6	—1½d
AUSTRALIAN GOLD		
Boulder Perseverance	2/6	.....
Gold Mines of Kalgoorlie	3/3xd	—7½d
Great Boulder Prop.	9/9	—3d
Lake View and Star	14/4½	+7½d
Mount Morgan	17/6	.....
North Kalgurli	7/3	.....
Sons of Gwalia	6/-	—3d
South Kalgurli	6/9	—3d
Western Mining	12/9	—1½d
MISCELLANEOUS GOLD		
Cam and Motor	9/9	.....
Champion Reef	4/10½	+4½d
Falcon Mines	6/4½	.....
Globe & Phoenix	24/-	.....
G.F. Rhodesian	5/3	—3d
London & Rhodesian	4/9	.....
Motapa	1/6	.....
Mysore	3/3	.....
Nundydroog	6/-	+3d
Ooregum	4/4½	—1½d
Oroville	11/6	.....

MISCELLANEOUS GOLD (contd.)	Price Sept. 23	+ or — on week
St. John d'El Rey	25/9	+3d
Zams	26/6	+1/-
DIAMONDS & PLATINUM		
Anglo American Inv.	3 3/16	+5/16
Casts	22/-	+9d
Cons. Diam. of S.W.A.	4¼	+1/16
De Beers Defd. Bearer	64/6	+1/9
De Beers Pfd. Bearer	15½	+¼
Pots Platinum	6/9	.....
Watervaal	11/6	—3d
COPPER		
Chartered	51/3	—1/-
Esperanza	4/9	+3d
Indian Copper	3/10½xd	—1½d
Messina	3 5/16	+1/16
Nchanga	6 1/16	—¼
Rhod. Anglo-American	47/6	.....
Rhod. Katanga	13/10½	+2/7½
Rhodesian Selection	14/10½	.....
Rhokana	18	—1/16
Rio Tinto	20	+¼
Roan Antelope	13/7½	+3d
Selection Trust	30/-	—7½d
Tanks	57/6	—9d
Tharsis Sulphur Br.	41/3	—1/3
TIN (Eastern)		
Ayer Hitam	23/9xd	—6d
Bangrin	8/4½	+4½d
Gopeng	7/9	—3d
Hongkong	6/-	—1½d
Ipoh	15/7½	.....
Kamunting	7/9	—3d
Kepong Dredging	4/3xd	.....
Kinta Tin Mines	10/-xd	.....
Malayan Dredging	23/6xd	+6d
Pahang	13/3	+3d
Pengkalen	8/3	.....
Petaling	8/7½	+1½d
Rambutan	10/-	.....
Siamese Tin	8/9	+4½d
Southern Kinta	13/1½	+10½d
S. Malayan	23/3xd	+3d
S. Tronoh	7/9	+3d
Sungei Kinta	10/7½	+7½d
Tekka Taiping	4/4½	—4½d
Tronoh	22/3xd	.....
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	10/4½	+3d
Beralt Tin	26/9	—6d
Bisichi	4/-	.....
British Tin Inv.	12/3xd	—9d
Ex-Lands Nigeria	3/6	—1½d

TIN (Nigerian and Miscellaneous) contd.	Price Sept. 23	+ or — on week
Geevor Tin	9/9	+3d
Gold & Base Metal	3/4½	.....
Jantar Nigeria	7/7½	+6d
Jos Tin Area	11/3	.....
Kaduna Prospectors	2/3	.....
Kaduna Syndicate	2/6	.....
London Tin	5/4½	+1½d
United Tin	2/4½	+1½d
SILVER, LEAD, ZINC		
Broken Hill South	2 1/16	.....
Burma Mines	1/4½	.....
Consol. Zinc	24/-	.....
Lake George	9/6	+1½d
Mount Isa	32/-	—3d
New Broken Hill	22/-	.....
North Broken Hill	2¼	.....
Rhodesian Broken Hill	10/9	.....
San Francisco Mines	17/6	.....
Uruwira	2/9	.....
MISCELLANEOUS BASE METALS & COAL		
Amal. Collieries of S.A.	43/3	—6d
Associated Manganese	45/3	—6d
Cape Asbestos	20/9	—1½d
C.P. Manganese	53/-	—3/10½
Consol. Murchison	19/9	—10½d
Mashaba	4½d	.....
Natal Navigation	3¼	.....
Rhod. Monteleo	5/-	.....
Turner & Newall	56/3	+1/-
Wankie	11/-	.....
Witbank Colliery	3 3/16	.....
CANADIAN MINES		
Dome	$30	.....
Hollinger	$22½	—¼
Hudson Bay Mining	$74	—2
International Nickel	$70½	+¼
Mining Corpn. of Canada	£3½	.....
Noranda	$119	—4
Quemont	£5 7/16	—1/16
Yukon	4/1½	+3d
OIL		
Anglo-Iranian	7 1/16	-1/16
Apex	38/9	.....
Attock	33/1½	+1/3
Burmah	53/9	.....
Canadian Eagle	28/9	—3d
Mexican Eagle	22/1½	.....
Shell (bearer)	4½	+1/16
Trinidad Leasehold	28/6	+1/-
T.P.D.	21/9	—3d
Ultramar	25/6	—4½d

COMPANY NEWS AND VIEWS

"Johnnies" Share Dealing Profits

The full report and accounts of Johannesburg Consolidated Investment Company for the year ended June 30 last confirms that profitable share dealings played a prominent part in the expansion of total income from £1,616,851 to £2,260,527, an increase of £643,676.

The profit and loss account analyses the total revenue figure and reveals that investment income—including dividend income—advanced by £241,897 to £1,486,459; share dealing profits rose by £285,675 to £401,914; and finally, fees and net sundry revenue increased by £116,104 to £372,154. Of the three sources of income perhaps the most noteworthy is the expansion in revenue received from share dealing profits. This item stands out because investment income—as pointed out in a note in the profit and loss account—was swollen by the addition of £203,000 from dividends which, if they had been declared at their usual time instead of at a later date, would have been included in the previous year's accounts. Secondly, the period covered by the accounts was not unduly propitious for share dealing transactions in the gold share market although developing mines, the two Freddies included, showed marked fluctuations over the year indicating that there was room for successful transactions.

Be that as it may, a more likely guide to the increase in profits from share dealing is provided in the balance sheet which shows that holdings of quoted investments were down by £283,704 to £8,687,229, a decrease not far short of the profit figure realized by share dealing activities. If the liquidation of these holdings does account for the bulk of the profit increase it would, of course, suggest a healthy profit per share realized. But even so, this should not have been too difficult to effect for the company presumably has shareholdings purchased at par which have now risen to at least double their par value.

In any event, it is impossible to do more than hazard a guess at how the share dealing profits were achieved and it will be interesting to hear what the chairman, Mr. H. J. Joel, has to say on this matter at the Annual Meeting to be held in Johannesburg on November 24.

The only other point which calls for comment is that loans to the two Freddies have jumped from less than £2,000,000 to £4,600,000. The company regards these as long term investments so that Johnnies, more than ever before, will be identified with the two Freddies and the course of its share price will be governed to a large extent by the future progress of these two mines. Particularly so as the cost of supporting these two mines has led to the situation where the company's current liabilities exceed its current assets by £617,014.

South Kalgurli Makes Steady Progress

With the tonnage treated slightly higher, but the grade of ore slightly lower, South Kalgurli Consolidated's gold production during the year to March 31 last, remained virtually unchanged.

Year to Mar. 31	*Treated (tons)*	*Grade (dwt.)*	*Yield (oz.)*	*Ore Reserves*			
				Proved		*Probable*	
				(tons)	*(dwt.)*	*(tons)*	*(dwt.)*
1953	107,964	5.01	23,909	205,400	5.06	131,400	5.04
1952	103,813	5.16	23,703	213,400	5.13	139,600	5.04

Bullion proceeds achieved a welcome increase helped by the £16,106 additional revenue received from a full year of sales of gold in the open market, compared with £10,367 received for only 24 weeks in the preceding year. Mining costs, an omnibus item, covering the cost of ore extraction, opening up ore, and prospecting and treatment is difficult to analyse, but it would appear that its increase was due to the increase in the basic wage paid to employees by £A1 6s. 1d. per week although the expenditure on development work, which amounted to £A43,011 against £A39,511, was also a contributory factor. Nevertheless, encouragement can be taken from the fact that the increase in the basic wage was A13s. 2d. less than the increases for the preceding year.

Year to Mar. 31	*Bullion Proceeds*	*Mining Costs*	*Taxation*	*Net Profit*	*Dividend*	*Carry Forward*
	£	£	£	£	%	£
1953	311,767	279,874	15,530	9,757	20	15,189
1952	303,211	262,434	21,700	12,603	25	12,307

In any event, it was the increased costs which prevented the company from showing results comparable to those achieved in the previous year, despite the lighter off-take in taxation. Shareholders received less, there was no allocation to reserves, but the forward balance at the financial year end was left stronger at £15,189 compared with £12,307 brought in.

Mr. T. Pryor is chairman. Meeting, London, October 15.

Amalgamated Tin Mines' Good Results

The advance statement of results of Amalgamated Tin Mines of Nigeria for the year ended March 31 last, announced the recommendation of a final dividend of 14 per cent making, with the two interims already paid of 8 per cent each, 30 per cent for the year, the same distribution as has been paid on the company's issued capital of £1,950,000 in 5s. shares for the past two years.

Year to Mar. 31	*Production tin (tons)*	*c'bite*	*Working Profit*	*Taxation*	*Net Balance**	*Dividend*	*Carry Forward*
			£	£	£	%	£
1953	4,710	577	1,732,163	1,121,000	334,163	30	242,596
1952	4,650	304	1,254,889	770,000	326,702	30	222,383

* Struck after providing for taxation as shown above; additional depreciation and depletion of £225,000 (1952 - nil); written off trade investment and loan of nil (1952 - £23,187); providing nil against £200,000 for special depreciation reserve; and allocating £100,000 (nil) for royalty equalisation reserve; but includes the sum of £48,000 transferred from royalty equalisation reserve (1952 - £65,000).

The big expansion in profits, before tax, presumably reflects the much higher average price received for its columbite production. For even though its tin output showed a satisfactory improvement the lower average price per ton tin received over the year would have prevented proceeds from this source to have raised revenue to much—if at all—above the 1952 figure.

Taxation, of course, was much higher, and after making the appropriations noted in the footnote to the above table, the net balance remained practically the same as in the preceding year.

Although the tin price has shown a substantial decline since the beginning of the company's financial year, this decline should not drastically affect the company's position, as the price which it will receive for its columbite—depending on the grade of the columbite concentrates per ton—could mean as much as £2,000/£2,500 per ton, or even more. The company has stepped up its columbite production in the current year and at the end of the first five months had produced 265½ tons columbite, and 1,569 tons tin, which compares with 169 tons columbite and 1,774 tons tin in the corresponding period of the year under review.

Subject to confirmation at the annual meeting to be held on October 27 next, the dividend will be paid on October 28. Mr. J. Ivan Spens is chairman.

Southern Kinta Pays Same on Expanded Earnings

The preliminary profit statement of results for the year ended March 31 last of Southern Kinta Consolidated showed a healthy profit expansion, before tax, of £278,365 to £1,737,476.

Year to Mar. 31	*Output (tons)*	*Working Profit*	*Taxation*	*Net Balance**	*Dividend*	*Carry Forward*
		£	£	£	%	£
1953	4,264	1,737,476	1,055,000	346,933	50	333,692
1952	4,021	1,459,111	923,000	274,111	50	245,296

* Struck after providing for taxation as shown above; additional depletion of property £80,000 (1952 - nil); written off restoration expenditure of nil (1952 - £62,000); provision for river deviations of nil (1952 - £100,000); allocation to general reserve of £65,543 (1952 - nil); and allocation to dredge removal and reconstruction reserve of £190,000 (1952 - £100,000).

Taxation took £312,000 more, and as the footnote to the table above shows, other appropriations made before striking the net

balance amounted to £335,543 against £262,000, leaving a net balance of £346,933, an increase of £72,822 over the preceding year.

The total distribution of 50 per cent per 5s. share on the one class capital of £962,000 was paid as to two interims of 12½ per cent, and a recommended final of 25 per cent, the same as in the preceding year.

While shareholders might feel disappointed that a higher total distribution was not forthcoming, the strengthening of the company's financial position now may well be the means by which the company will be enabled to make higher payments during the current year than the actual results may warrant. This is because the average tin price, during the first five months of the current year at any rate, was far from comparable to that received in the corresponding period of the year under review, while production for the first five months of the current year at 1,652 tons represents a decline of approximately 400 tons on the corresponding period of the year under review.

Subject to confirmation at the annual meeting to be held on October 27 next, the dividend will be paid on October 28. Mr. J. Ivan Spens is chairman.

"Indians" Mixed Results in August

The output returns and eight month cumulative totals for the four Kolar Gold Field Companies showed mixed results in August. Ooregum's low tonnage throughput and gold recovery is undoubtedly indicative of the easing off in mining operations preparatory to its being worked with Champion Reef. This latter company announced above average results although its cumulative total to date does not hold out much hope that the end year production figure will be comparable to that achieved in 1952.

Company	August, 1953		Months since year end	Current Financial Year Total to date		Last Financial Year Total to Date	
	Tons (000)	Yield (oz.)		Tons (000)	Yield (oz.)	Tons (000)	Yield (oz.)
Champion Reef	13	4,813	8	86	33,874	106	46,980
Mysore	16	5,919	8	124	47,386	139	48,208
Nundydroog*	23	6,162	8	164	45,671	170	41,840
Ooregum	3	1,060	8	63	16,743	85	23,867

*Includes tailings.

Mysore's output return was a good average and although the tonnage throughout to-date falls short of the corresponding figure in the preceding year by approximately 15,000 tons, the gold output is less than 1,000 oz. short of the corresponding figure in 1952. Nundydroog was easily the most outstanding return of the four companies and gold production is nearly 4,000 oz. in advance of that obtained in the corresponding period of 1952.

Mining Men and Matters

Mr. C. J. Burns has been appointed a director of National Mining Corporation.

The death is announced of **Francis Patrick Irwin Crossley,** a director of Crossley Brothers.

Mr. J. E. Denyer has been appointed to the board of the Anglo-French Exploration Company.

Mr. Kenneth Hudson has been elected chairman of Robert Hudson and also of its subsidiary, Robert Hudson and Sons (Proprietary).

Mr. L. E. Mole has resigned his directorship of C. A. Parsons.

Mr. A. R. Neelands, chairman of the Cementation Group of Companies, is now visiting Canada to inspect operations and to consult with the managing directors of the Canadian subsidiary companies.

Mr. R. S. H. Richards has been appointed a director of Mason and Barry.

Mr. E. B. Walker, Technical Director of Messrs. Walker Bros. (Wigan) Ltd., has retired from the Board at his own request. Mr. Walker was closely connected with the many varied types of equipment manufactured by the company, and in particular with the design and supply of large ventilating plant for mines and tunnels in the U.K. and overseas.

The death is announced of **Mr. D. J. Ward,** chairman of the Pahang Consolidated Company.

TEKKA-TAIPING, LTD.

MR. DONALD W. THOMAS'S REVIEW

The Thirty-third Ordinary General Meeting of Tekka-Taiping, Limited, was held on September 16, 1953, at the Registered Office, Redruth.

Mr. Donald W. Thomas (Chairman) presided.

The Reports and Accounts for the year ended October 31, 1952, having been circulated for the prescribed time, were taken as read as was also the Chairman's Statement, circulated with the Report and Accounts, which was as follows:—

Shareholders will observe from the Directors' Report that Mr. Stanley Wickett has retired from the Chairmanship of the Board and that I have been done the honour of being elected to fill his place. Mr. Wickett retains his seat on the Board and we hope we may long have the benefit of his counsel and advice.

Accounts for the year ended October 31, 1952, show a gross profit of £12,968. The considerable decrease in the profit as compared with the previous year is accounted for, in part by the much lower average price of tin, in part by the stoppage of the dredge for the last three months of the year, and in part owing to the lower grade of the ground dredged.

From the General Manager's Report it will be noted that the Production Cost of Tin-ore shows a considerable increase. I wish to state, however, that the Mining Expenditure for the year under review covers a gratuity given to a retiring senior employee with many years of service who, by reason of age, was not eligible to participate in the Company's Pension Scheme.

The Mining Expenditure also includes the costs incurred in connection with the repairs and renewals to the Dredge, which, as previously advised you, was idle for more than three months of the year, during which time no tin was recovered by dredging.

Two dividends totalling 1s. per share were paid to Shareholders on account of the financial year which absorbed £10,750, taxation absorbed a further £10,172, and the balance remaining on Profit and Loss Appropriation Account is £35,012, which it is proposed to carry forward to the current year.

The Company's claim for War Damage has now been assessed and it is hoped that the current account is the last in which figures relating to this item will be included.

Attention is drawn to the report of the General Managers, Messrs. Osborne and Chappel, which gives the usual statistics.

Although, as the General Managers report, there were no incidents in the vicinity of the Company's property during the year, your Directors realize that the Staff and Labour force at the Mine are still working under conditions of potential danger, and for their services and for those of our General Managers we record our deep appreciation.

The output for the current year October to December, 1952, was 36¼ tons of tin-ore; January to March, 1953, 63¾ tons of tin-ore; April to June, 1953, 66 tons of tin-ore. Shareholders will remember that in the postcard reporting the last Quarter's output it was stated that during the Quarter the Dredge had been operating in very low grade tailings. (*Note*: These figures correct those for last year inadvertently given in the Statement accompanying the Accounts.)

I should like to repeat here what I said in another statement, that despite frequent reports to the contrary, I wish to draw particular attention to the amount of health and welfare services provided by this Company and many others in the Colonies by private enterprise. Large sums are expended annually under such headings as Asian Staff Provident Fund, Insurance of Asian Staff, Pensions, Medical, Security Measures and Emergency Regrouping.

CHAIRMAN'S SUPPLEMENTARY REMARKS

In a supplementary statement the Chairman said:—

"As advised in my published Statement the dredge has been operating in very low grade tailings and I regret to inform Shareholders that recovery from these tailings has been most disappointing over recent months. Further, although there are some better values in depth ahead of the dredge, they are also partly covered by tailings and the General Managers now advise that present indications are that the dredge is unlikely to work these profitably at the present tin price.

"Various alternatives, including the possibility of shutting down the dredge, are being considered by your Directors. I have arranged to visit the property and will be examining the position personally with the General Managers in Malaya in the immediate future."

The Statement of Accounts and Balance Sheet, together with the Directors' Report, were received and adopted.

CLIMAX ROCK DRILL AND ENGINEERING

CONTINUED EXPANSION OF SALES

PROGRESS AT HOME AND OVERSEAS

The fortieth annual general meeting of The Climax Rock Drill and Engineering Works, Ltd., was held on September 23 in London, **Mr. Ralph Ewing, A.M.I.Mech.E.** (the chairman), presiding.

The following is an extract from his statement which had been circulated with the report and accounts:—

The net profit for the year before providing for taxation is £57,775. This includes profit on sales of fixed assets amounting to £9,564, which, if deducted, leaves £48.211 as the net trading profit for the year. The comparative figure (after deducting £901 profit of sales of fixed assets) for the 15 months ended March 31, 1952, on a 12 months' basis, is equal to £45,007, thus there is an increased profit in the year under review of £3,204.

Notwithstanding considerable fluctuations in different markets, due principally to currency difficulties, the increase in the company's turnover has been maintained, being 8.9 per cent greater for the 12 months to March 31, 1953, than for the corresponding 12 months.

An interim dividend of 2½ per cent, less income-tax, has already been paid and a final dividend of 3½ per cent, less income-tax, is now recommended, making the total distribution 6 per cent, less income-tax, for the year ended March 31, 1953. A dividend of 7½ per cent, less income-tax, was paid last year in respect of the 15 months ended March 31, 1952, so that in effect the distribution rate remains unchanged. In deciding on their recommendation for the year under review the directors have in mind the necessity of conserving the company's resources in the light of the more difficult trading conditions now obtaining.

Our sales during the 12 months under review continued to expand both at home and overseas and I am pleased to report that our sales turnover was a record for peacetime operation.

In my last year's report I referred to the possible restriction in certain overseas markets and this actually took place particularly in Australia, New Zealand, Spain and the South American continent. Both Australia and New Zealand were, and still are, affected by import controls which seriously reduced our turnover and the South American markets suffered from a lack of sterling which had an equally bad effect on orders on hand and future expansion.

In spite of these drawbacks we were able to increase our overseas trade with beneficial results, particularly in Scandinavia, Turkey, and Siam. Our South African sales, which take a large part of our output, remained at last year's level.

Our two subsidiary companies, India and Canada, continued to make progress and while not yet operating at a profit the sales turnover in India showed a satisfactory expansion, but competition is definitely on the increase, particularly from Continental makers.

In the home market, while the sale of our standard products continued to expand steadily, it is satisfactory to report that our Maxam department continued to go ahead and more than doubled its sales turnover. Up to date our output of pneumatic control equipment has been absorbed by the home market, but overseas markets are now being catered for to a small extent which we hope to expand as our output increases.

Our co-operation with Messrs. Holman Bros., Ltd., has continued even more closely than before and our design and development department continues to study with theirs the development of air compressors, rock drills and other equipment in order that every advantage may be taken of improvements in methods and materials, while as regards production the co-operation has led, I feel sure, to mutually satisfactory results. I am glad to state that from our production we were able fully to meet the requirements of Holman Bros., Ltd., and in the year under review approximately 13 per cent of the value of our sales turnover was in respect of supplies to that company.

At present our order book is not so full as it was a year ago and while this enables us to give earlier deliveries than for some time past, the trend of orders is not so satisfactory. Selling prices have passed their peak and with increasing competition, particularly overseas, they will have to be reduced. Every effort has been made by improved methods to keep costs steady and even to reduce them, in spite of the increased costs in material and wages. Even so, with taxation at its present level, there is little margin left for the replacement of plant which is so essential to production of high-grade pneumatic equipment.

The report and accounts were adopted.

DIVIDENDS

Ayer Hitam Tin Dredging 1s. 3d. *i* (October 9)
British Tin Investment 7% *i* (October 10)
Chartered Bank of India, Australia and China 7% (October 2)
Kinta Tin Mines 7½% *i* (September 26)
Sungei Besi Mines 4.8d. *i* (October 12)
Tanjong Tin Dredging 12½% *i* (September 30)
Zambesia Exploring 4% *i* (October 19)
i interim

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